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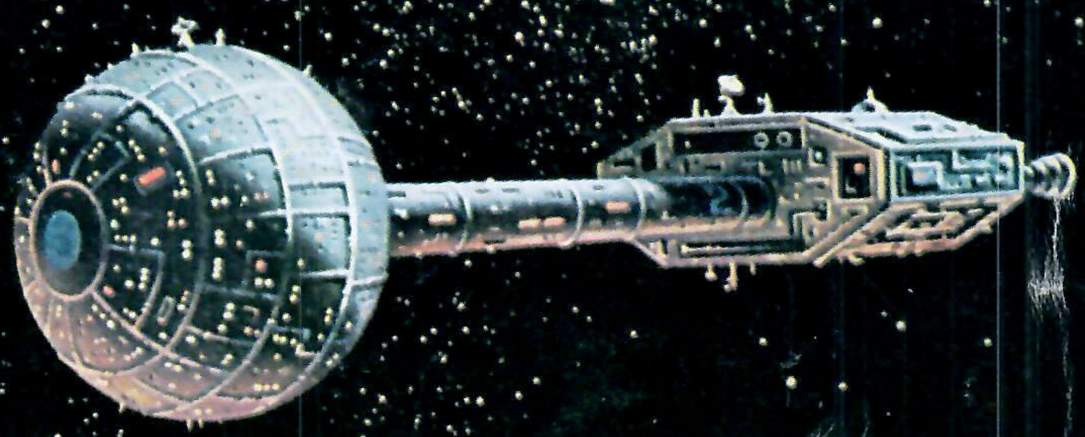

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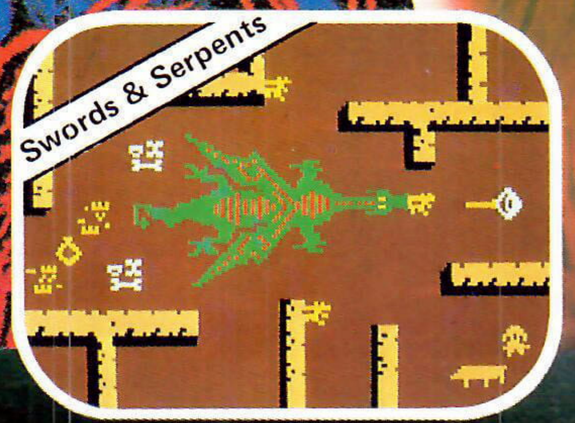

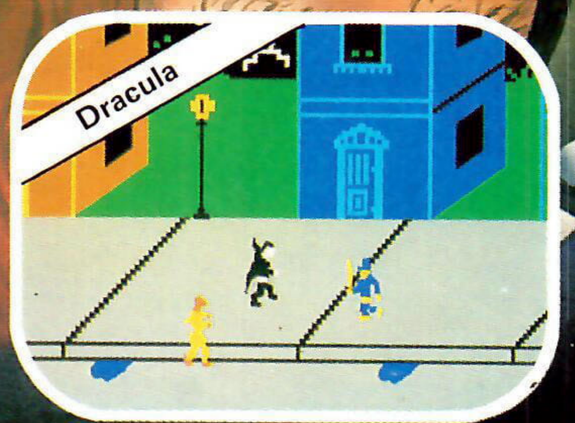

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SPACE VOYAGER

ISSUE No. 5 OCTOBER/NOVEMBER, 1983

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ON THE COVER
David Hardy's fine painting of Terraformed Mars supports his intriguing article which starts on page 38 of this issue.
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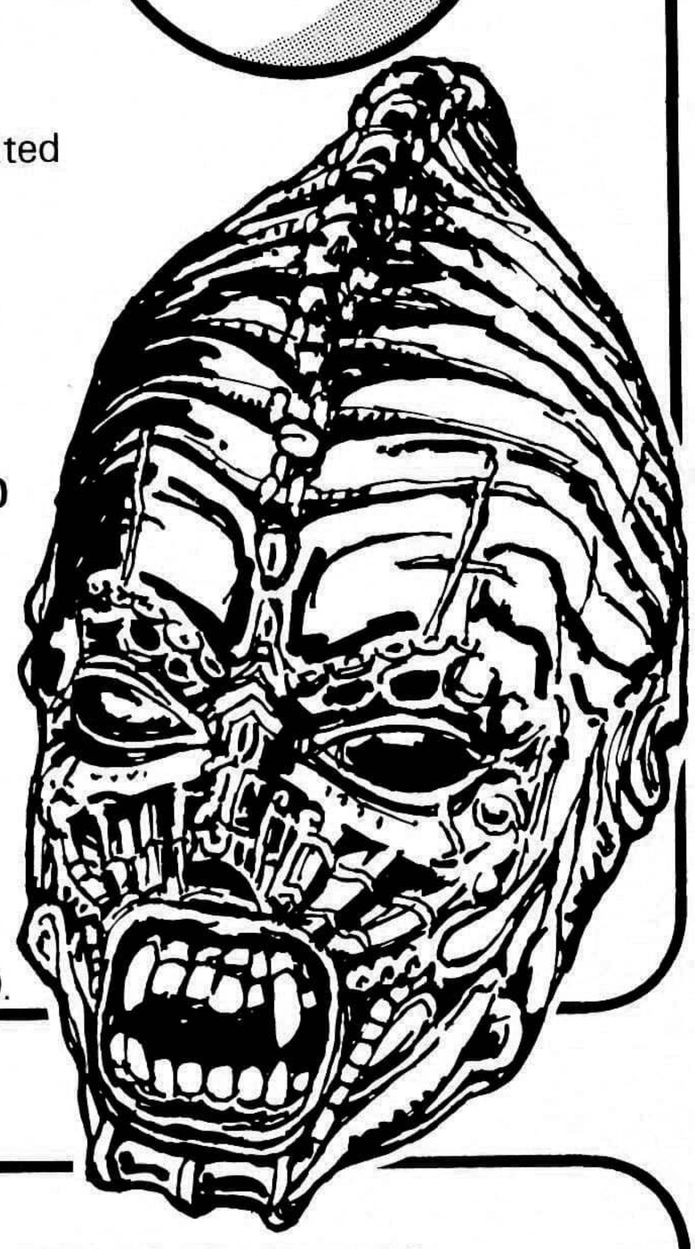

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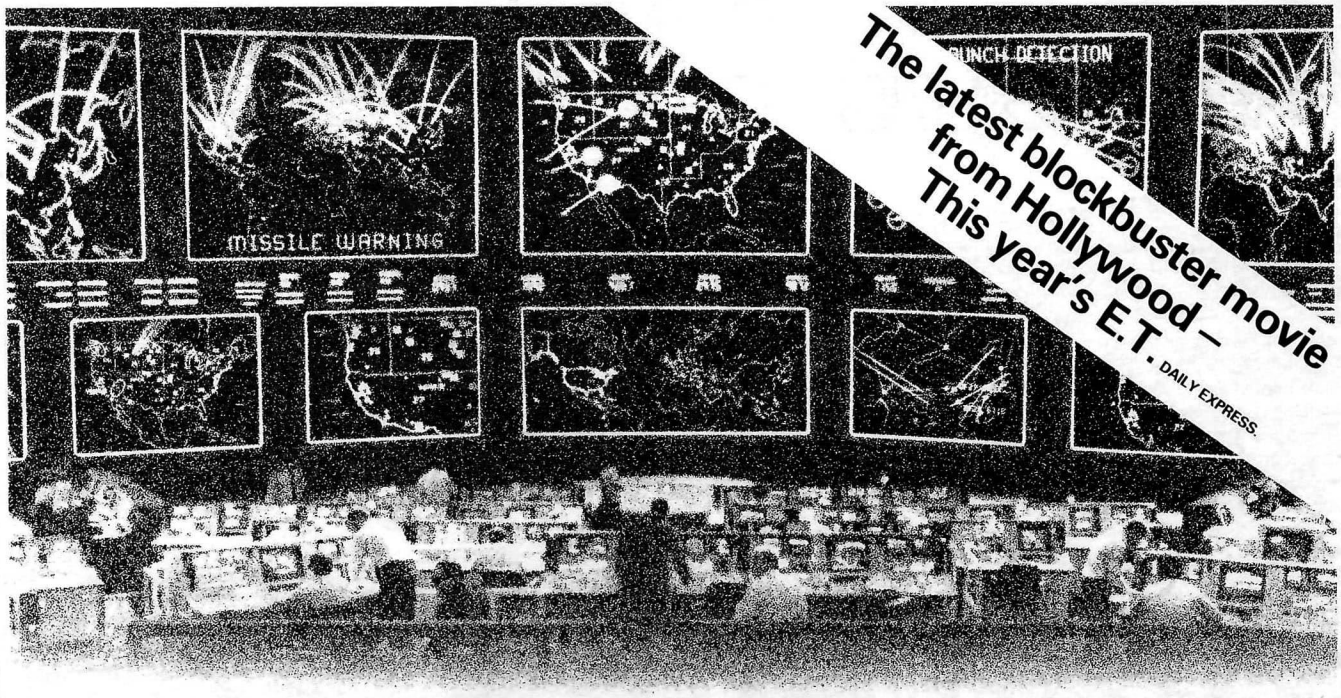

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CAPTAIN'S LOG

The first year of publication has been one of excitement, gratification, and unqualified success and now that *New VOYAGER* has sown the seed, the title reverts back to the original *SPACE VOYAGER*. Although there's a very necessary price rise, mandatory to maintain our high standards as production costs rise, at least readers will be getting *six* issues a year, instead of four, as we go bi-monthly with this edition. And what an edition!

Our promised feature on *Blue Thunder* is replaced by the first of two *exclusive* colour features on the special effects of *Return of the Jedi*. With rare photos, courtesy of **Lucasfilm,** we are the only European magazine to bring interviews with the leading SFX technicians whose work has enthralled us all in the final part of the middle trilogy. The interview with Anthony Daniels is another exclusive and we also look at the background to this year's other big SF production, *The Twilight Zone,* now on current UK release.

Friends of Nichelle Nichols

I was pleased to be made an honorary member recently of the Friends of Nichelle Nichols (FONN) a new organisation for fans of *Star Trek*'s Lieutenant Uhura. Membership to the club, which is international, is only $10.00 and members receive a membership card, an autographed photo, a letter from Nichelle, plus a copy of her latest recording, *Beyond Antares,* a collectors' item sold previously only by mail order. The membership also entitles fans to a quarterly newsletter and further details can be obtained from the FONN chief, Allen Johnson, at PO Box 1177, Beverley Hills, California, CA 90213, USA.

Tameside SF Modelling Society

Formed in 1979, there are now over 40 members of the Tameside Science Fiction Modelling Society including honorary life members, Thom Christopher, Ed Bishop, Dave Prowse, Mat Irvine, Martin Bower, and yours truly. The club frequently exhibits at model meetings and would welcome new members. Interested modellers should contact John Maley at 63 Mount Road, Gorton, Manchester, enclosing a stamped addressed envelope.

The Friends of Nichelle Nichols is a new organisation for all 'Star Trek' fans which entitles members to a quarterly newsletter. Might be the best way of finding out more about the new film which will be directed by Leonard Nimoy.

Friends Of Nichelle Nichols

INTERNATIONAL MEMBERSHIP

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VOYAGER

EXPIRATION DATE June 28, 1984

Russian probes

The Soviet Union launched two more probes towards Venus in the middle of the year. Venera 15 was launched on June 2, followed by Venera 16 on June 7. These will be orbiting craft and the plan is to map the planet, possibly by means of a similar system used by the ocean surveillance craft. These use radar and are nuclear powered, and one of them – Kosmos 1402 – caused a certain amount of concern at the beginning of 1983!

The two Veneras are due to arrive at Venus in October and although the mapping will presumably be fairly comprehensive, the resolution is unlikely to be as good as the proposed US Venus Radar Mapper mission. However, the Soviets do have the advantage that these two probes are at least on their way, while VRM will have to wait until 1988.

ISO plan

The European Space Agency is planning another astronomical satellite. Called ISO (Infrared Space Observatory) this craft would consist of a 60 cm/24 ins telescope, sensitive to infrared radiation. It isn't planned to be launched until the beginning of the 1990s, but will complement work that will have already been started by the Space Telescope, due for a 1986 launch.

Swap Meet

On Saturday, October 15, there is a Swap Meet at the Cranford Community School, Cranford High Street, Cranford, Middx, which is swapping and selling space toys and models. Interested readers can contact Yvonne Tillyer at the above address (SAE please), or telephone 01-897-7901.

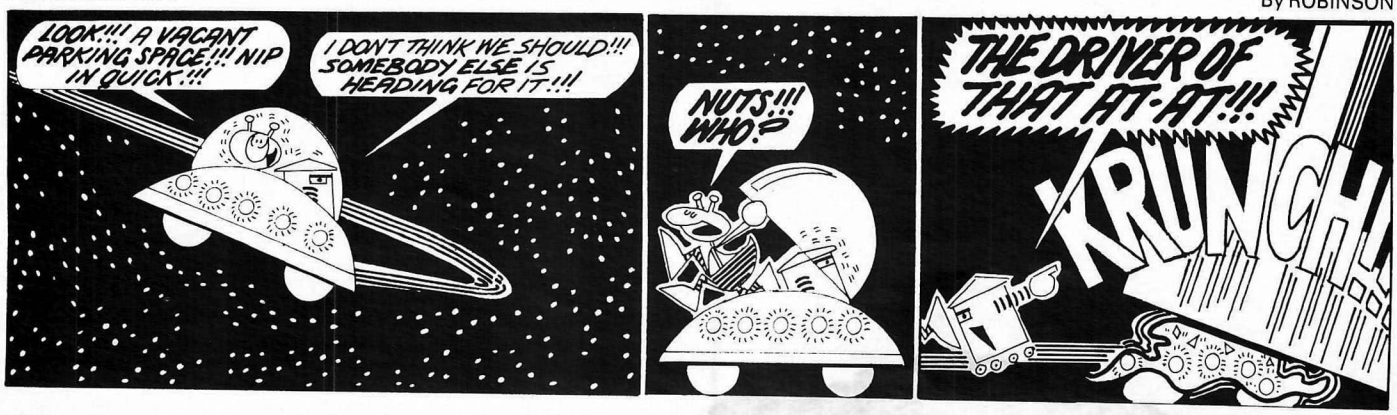
Space modellers unite!

Space modelling enthusiast Bob Hey reckons we need another specialist society and is planning on starting *The Outworld Modelling Society,* which would issue a quarterly newsletter. However, he would like to sound out interested potential members and so if you would like to see the Society formed, drop him a line for the prospectus, but please enclose a stamped, addressed envelope – Bob cannot afford to subsidise the Post Office! His address is Flat 1, 26, Taswell Road, Southsea, Portsmouth, Hants, PO5 2RG.

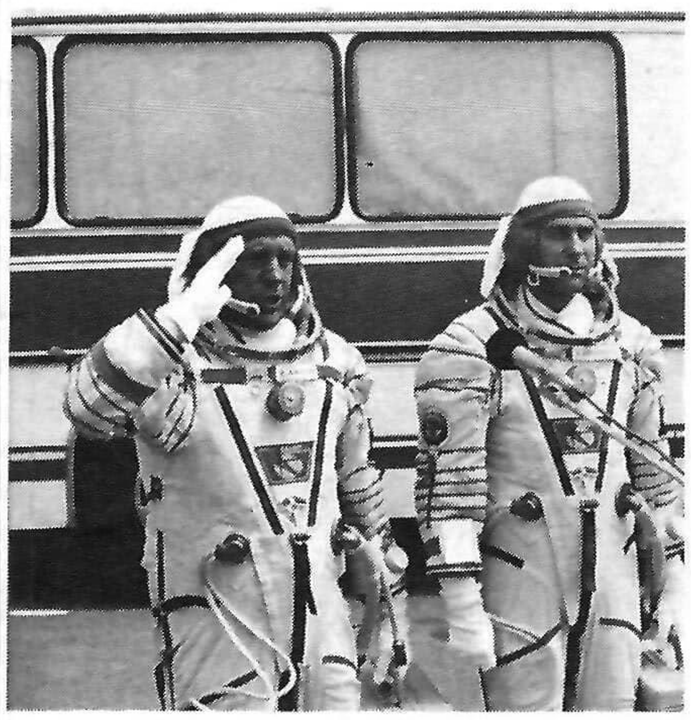
Ray Rimell

PLUTONIUM PETE

By ROBINSON


LOOK!!! A VACANT PARKING SPACE!!! NIP IN QUICK!!!
I DON'T THINK WE SHOULD!!! SOMEBODY ELSE IS HEADING FOR IT!!!
NUTS!!! WHO?
THE DRIVER OF THAT AT-AT!!!
KRUNCH!

DATA BANK



Soviet 'spacelab'

After the failure of the *Soyuz* T-8 flight to dock with *Salyut* 7 earlier this year, the Soviet space station was eventually manned in June. *Soyuz* T-9 was launched from Tyuratam on June 27, and docked the next day. On board were cosmonauts Vladimir Lyakhov, making his second flight, and rookie Aleksander Alexsandrov.

They are aboard a space station that is somewhat more than just the *Salyut* 7, for earlier it had been joined with the initially unidentifiable spacecraft, *Cosmos* 1443. As the 'Cosmos' banner covers a wide variety of craft, this Cosmos could have been any type, although it has now been shown to be the third in a new type of vessel that will greatly enlarge the Soviet space stations of the future. The first of the series was *Cosmos* 929, launched as early as July, 1977, followed in later years by *Cosmos* 1267 which was docked with *Salyut* 6. *Cosmos* 1443 is a multi-purpose carrier and tug, and contains not only more living space for the cosmonauts, but an additional rocket engine, electrical generator capacity and the ability not only to deliver stores to the Salyut, but to return cargo back to Earth.

Cosmos 1443 is 42½ feet long and just over 13 feet in diameter at its widest point. This gives an added 50 cu metres of habitable work area. 40 sq metres of solar panels give an addition 3 kw of power and a large propellant load is carried, both for *Cosmos* 1443's own engine and which can also be pumped to Salyut's engines.

The new craft can carry three tons of cargo into orbit, over twice Progress's capability, and can return nearly ½ ton to a water recovery.

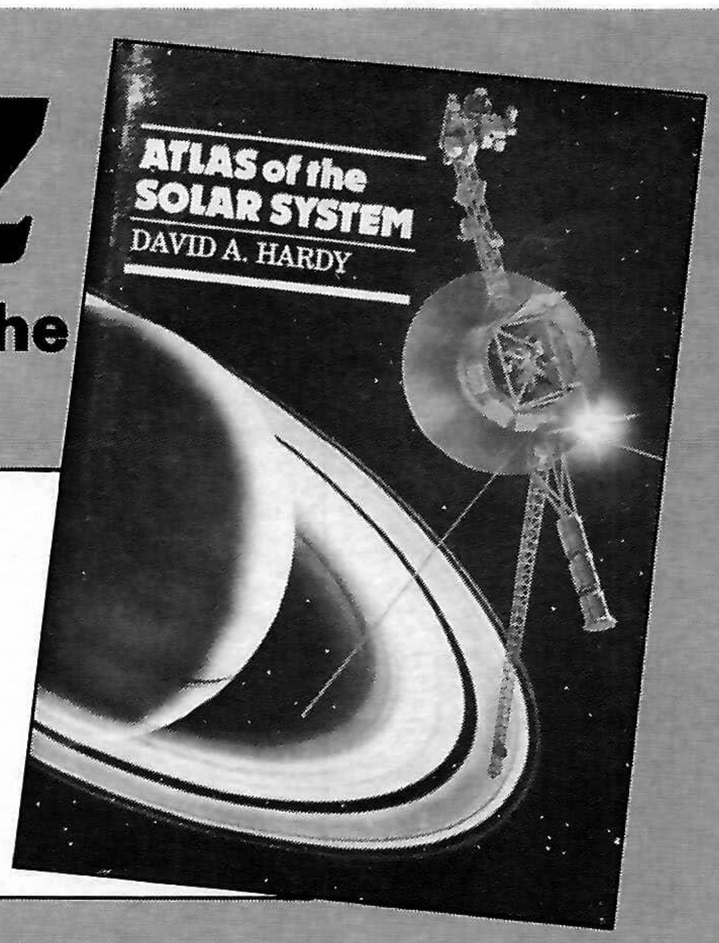
Saving a satellite

In a space rescue bid not seen since Apollo 13, NASA scientists and engineers have saved the first satellite in the Tracking and Data Relay Satellite series. Launched by STS-6 in April, TDRS-A was successfully carried into orbit by the Shuttle and the launch from the Orbiter went without a hitch. However, a problem then occurred. TDRS-A, being destined for a geostationary orbit, needed an additional boost from the low Shuttle orbit up to the 35 000 km high orbit occupied by the majority of comsats. The rocket stage for this part of the mission was the USAF/Boeing Inertial Upper Stage – IUS. A malfunction occurred with the IUS, probably jamming the second stage rocket bell and making steering of the combined craft impossible. The result was the pair tumbling, initially out of control, and the assumption that the mission – and a very expensive satellite – was lost. However, as was reported in the last edition of VOYAGER, the technicians managed eventually to get signals through to the craft, and the separation of the two was finally accomplished.

Then TDRS-A had to be moved into the correct orbit (it was travelling in an eliptical one) with the apogee – the point of an orbit furthest from Earth – being correct, but with a much lower perigee. With the IUS gone, TDRS-A had no main rocket engine. The only means of manoeuvering was by the tiny – in comparison – thrusters designed purely for the final adjustment to the orbit. These tiny rocket engines produce a mere 1 lb of thrust each and are only intended to work for short periods at a time. But they were the only motive power available, and so were pressed into service, 'far beyond the call of duty'. The particular pair of thrusters which did most of the work were fired 39 times in all to reposition the satellite, the last firing was for nearly six minutes, but some earlier ones had lasted for a whole hour at a

SPACE VOYAGER GUIZ

Win a FREE copy of David A. Hardy's 'Atlas of the Solar System' personally signed by the author



1st PRIZE

First 10 correct entries drawn on October 11, 1983, will receive each a *personally signed* copy of David A Hardy's 'Atlas of the Solar System' published by The World's Work!

5 RUNNERS UP

The next five correct entries will receive each a free year's subscription to Space VOYAGER!

VOYAGER presents a Guiz

What *is* a Guiz, you might well ask? It's a Galactic Quiz although, in this particular case, it's limited to the Solar System. The name came about during the first Space Age Exhibition organised for the London Borough of Haringey by Fred Clarke, and out of which the Astronomical Society of Harringey was born, chaired by our own Mat Irvine. The actual story revolves around a printing error which transposed the Q of 'quiz', with a 'G' and, consequently, spelled 'quiz'. Not wishing to delve into the politics of the problem, Fred decided that it was all done on purpose, hence GUIZ!

Space VOYAGER is offering 10 copies of David Hardy's recent book, 'The Atlas of the Solar System', to the first 10 correct answers to the following questions and, as the book concentrates on the Solar System, so do the questions.

1) The Sun

The life-giving body of the Solar System is not as pure as the ancients thought. Dark patches are well known as Sunspots, but what are the lighter patches that sometimes occur called?

2) Mercury

More like the Moon than the Moon, Mercury was once thought to rotate in the same number of days as its year, 88. What is the accepted figure these days?

3) Venus

Not the place of beauty mythology would have us believe. Compared with the Earth what, in atmospheres, is the pressure at Venus's surface?

4) Earth

The mean distance of Earth from the Sun is a convenient measurement when it comes to comparing the other planets, but what is this measurement called?

5) Mars

The 'Red Planet' has been well mapped by the Viking Probes, but what was the first space-probe to go *into orbit* around this planet?

6) Jupiter

As revealed by the Voyager probes, one of Jupiter's moons has the only known active volcanoes outside of Earth; which one is it?

7) Saturn

The Voyager probes have shown that the Saturnian ring system is far more complex than even imagined and, instead of a few rings, there are many hundreds. However, when there was thought to only be an 'A' ring, a 'B' ring and a 'C' ring, what was the gap between the A and B rings called?

8) Uranus

This planet, due to be visited by Voyager 2 in 1986, has a distinctly odd axial tilt. In degrees, what is it?

9) Neptune

The fourth gas giant planet, Neptune has only two known satellites, the larger of which moves in a retrograde (*ie*, 'wrong') motion around its parent. What is it called?

10) Pluto

Due to its highly eliptical orbit, Pluto is actually *inside* the orbit of Neptune, and will be for many more years. In what year was this tiny planet, now known to have a satellite 1/3rd its own size, discovered?

HOW TO ENTER

Simply write down the answers to our 10 questions and send, together with coupon at right, to Space VOYAGER GUIZ, M.A.P. LTD PO Box 35, Wolsey House, Wolsey Road, Hemel Hempstead, Herts, HP2 4SS. ***Entry is free.***

RULES

1. The contest will close on October 11, 1983. The first 10 correct entries to be opened will receive the prize as offered. The next 5 will receive the free subscriptions as offered. Winners will be notified by post and results published in **New VOYAGER** issue 6, published on November 11, 1983.
2. The entrant's name and address must accompany each entry.
3. Each entry should be accompanied by the special coupon cut from the lower right hand corner of this page. *One* coupon covers only *one* entry. Individuals can enter as many times as they wish but the number of entries will only be regarded as valid if accompanied by an equal number of coupons. Photocopies are *not* acceptable.
4. Proof of posting cannot be taken as proof of receipt and, whilst every care will be taken, the magazine publishers cannot accept responsibility for lost entries.
5. The competition is open to UK residents only with the exception of staff of M.A.P. Ltd., and their relatives, and printers, advertisers and contributors to **Space VOYAGER.**
6. Entry into the contest implies full acceptance of the rules and the Managing Editor's decision in all matters is final. Correspondence will not be entertained.

Space VOYAGER GUIZ CLIP COUPON

DATA BANK

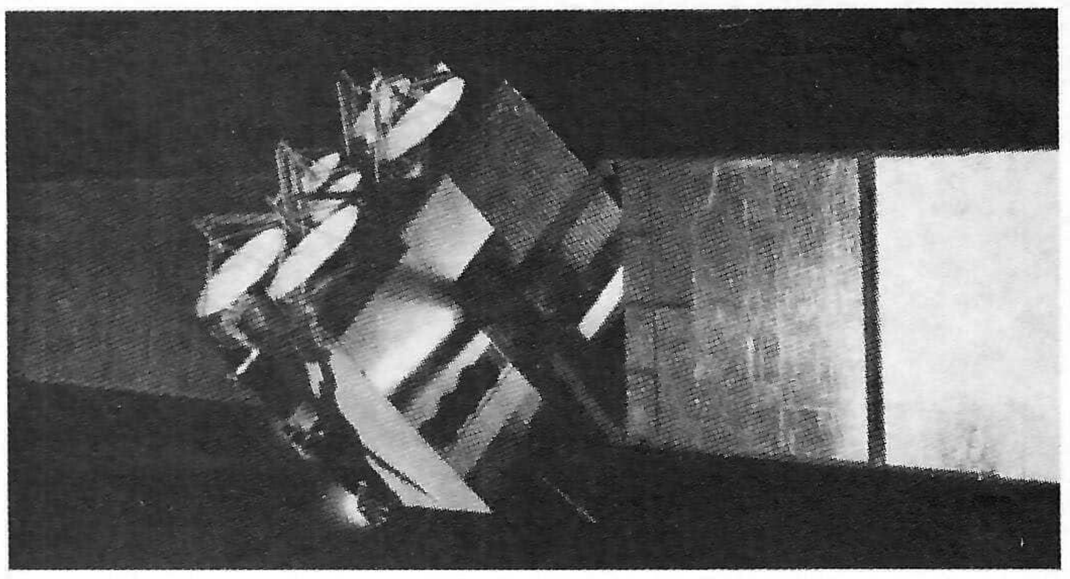
time. As a TRW executive remarked, 'it was rather like moving an aircraft carrier with an outboard engine'.

The entire move used up a good percentage of the thruster fuel – hydrazine – but luckily, because of an earlier change in the mission, more fuel than what would be usual was on board. Even so, 817 lbs of hydrazine has been used, which leaves just over 500 lbs left for overall station-keeping during the lifetime of the satellite. The estimate is that only 200 lbs of fuel will be needed, so it still leaves an acceptable margin.

Now in the correct orbit, TDRS-1 (as the satellites change from letters to numbers once in their correct position) went into service almost immediately, one of the first tests being with Landsat. Normally three months are allowed for systems check-outs, but TDRS-1 should be available for tests with STS-8, to allow full operational facilities with STS-9 and Spacelab-1.

TDRS-B, which should have flown on STS-8, has now been delayed until at least STS-12 because of the problems with the IUS, and possibly even further. NASA are also considering the possibility of using the second and third stages of the Delta 3920 rocket instead of the IUS. These would act as the first stage of the configuration with the standard PAM-D (Payload Assist Module) as the second.

Right, a model of the ECS-1 (European Communications Satellite) which was placed into orbit in June by Ariane L6 which blasted off successfully from Guiana. ECS-1 is the first of five such satellites being built by British Aerospace.
Photo: via Mat Irvine



Ariane L6

The sixth flight of the European Space Agency's launcher Ariane was a complete success – much to the relief of ESA after the failure of the fifth flight.

Lift-off was on June 16, from the Kourou launch site in Guiana, and two payloads were projected into orbit. One was the production model of BAe's Orbital Test Satellite, ECS-1 (European Communications Satellite) and the other, the amateur satellite AMSAT P 3B. They were launched by the first successful trial of SYLDA – *Système de lancement double Ariane* (Ariane Duel Launch System). which is a structure carried in the payload housing of the Ariane and allows the completely independent release of two satellites. ECS-1 is the first of five such satellites BAe is building for ESA. for use by *EUTELSAT*. ECS-1 is now in position 10° East over Gabon and will provide a European regional communications satellite system. Besides the usual telephone and telegraph traffic, ECS-1 will relay television distribution, audio and video conferencing, computer to computer links, remote newspaper printing and high-speed data links. ECS-1 is not intended for DBS (Direct Broadcasting by Satellite) but future satellites could be used experimentally.

Exosat

The latest in a line of astronomical observation satellites, Exosat, was launched at the end of May by a Delta 3914 rocket and placed in highly eccentric orbit. This orbit carried the satellite out to an apogee of 191 000 km (118 685 miles) far enough away from the influence of Earth's radiation belts, and also allows the ground station at Villafranca to be in contact for most of the orbital period.

Exosat, which stands for European X-Ray Observatory Satellite, will be studying X-Ray emissions from all types of cosmic objects ranging from nearby stars, binary systems, black holes out to the edge of the observable universe and the immensely powerful quasars. Exosat's instruments include two imaging telescopes and 21 independently controllable detectors. Although, in orbit, astronomers will be able to use the satellite just like an Earth-bound observatory, though with the advantage of not having to peer through many miles of atmosphere.

The other two astronomical satellites in orbit with a European connection are the International Ultraviolet Explorer, launched in 1978, and the more recent Infra-Red Astronomy Satellite (IRAS) which came to the public's attention in early May when it discovered the comet which now bears its name, along with the two more terrestrial observers – Comet IRAS/Araki/Alcock. Both IUE and IRAS have a large British participation with the involvement of the Science and Engineering Research Council.

CONVENTIONS

Compiled by Marion Van Der Voort

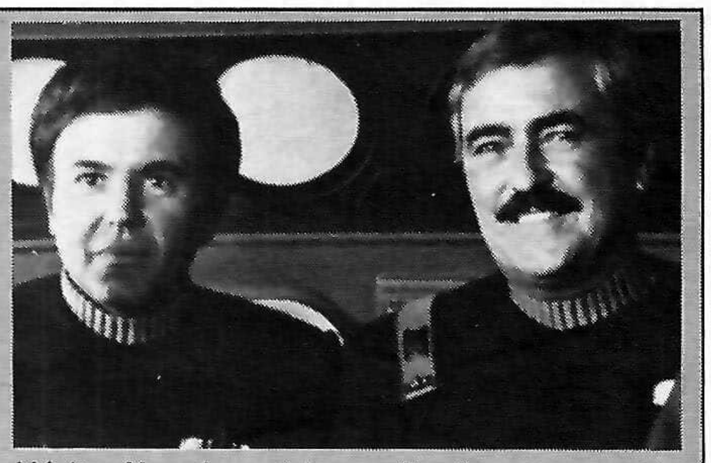
SOL III, held in Birmingham over the May Bank Holiday, was officially a *Star Trek* convention, and entertained, or was entertained by, James Doohan (Scotty) and Walter Koenig (Chekov) from the series, as well as SF writers Anne McCaffrey and Bob Shaw.

The balance was interesting, as both Jimmy Doohan and Anne McCaffrey are old hands at *Star Trek* and media conventions in this country, whereas Walter Koenig and Bob Shaw had never attended a British media convention before.

Lee Owers and her committee were also new hands at the game but, despite the high number of attendees (over 800) everything ran reasonably smoothly, with the usual talks, films and videos, as well as the traditional media items of fashion show, fancy-dress and disco.

Jimmy Doohan brought over his twin sons, who added a lustre to his already warm relationship with British fans, and a good time was had by all. Bob Shaw, who was a trifle nervous before he arrived, enjoyed himself hugely, and hopes to be asked again. Certainly, the attendees hope to see the same guests again some time.

The venue was again the Grand Hotel in Birmingham, which suddenly found itself in the convention circuit last year, took us to its heart, and still likes us. I must admit that when leaving, to be cornered by a waitress and asked if we're coming back in August, makes a pleasant change from most hotels, especially as our agreement produced a happy smile . . .*

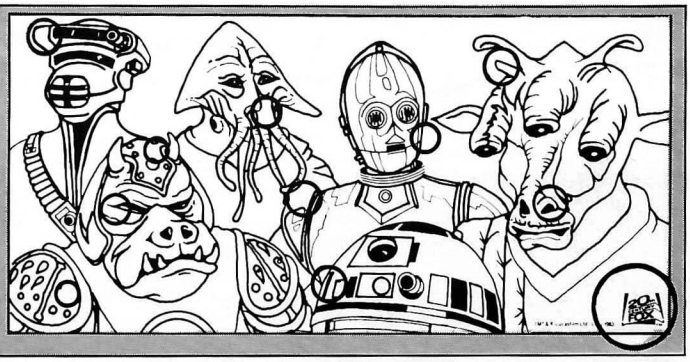


Walter Koenig and James Doohan were among the guests at SOL III held in Birmingham last May.

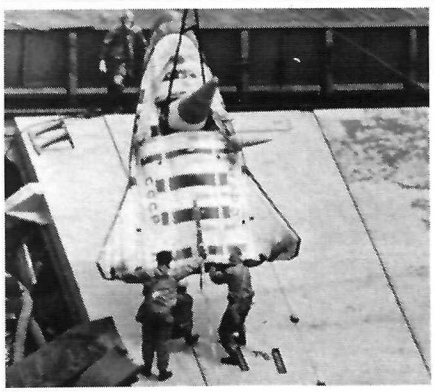
October 14-16	MIDCON 83 *(Star Trek)* Leicester. Guests: Bruce Hyde, Rupert Evans, Grace Lee Whitney. Terry Elson, 8 Ennerdale Close, Oadby, Leicester, LE2 4TN.
October 15	COMIC MART, Central Hall Westminster. Afternoon only. Free admission.
October 29-30	GALACTICON (Media) London. Guests: Peter Tuddenham, Mat Irvine, Michael Keating, Dee Robson.
November 4-6	NOVACON 13 (SF) Birmingham. Guest: Lisa Tuttle. Chris Donaldson, 46, Colwyn Road, Beeston, Leeds 11.
November 11-13	THE THIRD LEONARD NIMOY CONVENTION, Nottingham. Carol Davies, 77 The Ridings, Ealing, London, W5 3DP.
December 10	COMIC MART – as October 15.

JEDI WINNERS

Several thousand readers responded to our Return of the Jedi Spot-the-Difference *contest we ran in Issue No. 4. The first prize of a year's free membership to the* STAR WARS FAN CLUB *plus one each of all the* Star Wars *kits in the* **Airfix** *range (including the three new Jedi ones) was Mr LEE Edwards of Hemel Hempstead. Second prize of* Snowspeeder, AT-AT, X-Wing, Tydirium, Speeder Bike, Rebel Base, Encounter with Yoda on Dagobah *and* Battle on Hoth *kits was a Mr A Patterson of Westgate on Sea. Winner of the third prize was Mr G Parnell who will receive* Jabba the Hutt Throne Room, Slave I *and* Snowspeeder *kits. Five runners-up, each to receive one year's free subscription to* Space VOYAGER *were: Mr K Fairburn of Malvern, Mr D Kitchen of Epsom, Mr G Marshall of Deal, Mr I Macbeth of London and Mr J Oliver of Rotherham. The correct solution is shown at right.*



Above and below, views of the Soviet Shuttle taken by the RAN ship HMAS Moresby and a RAAF Orion.

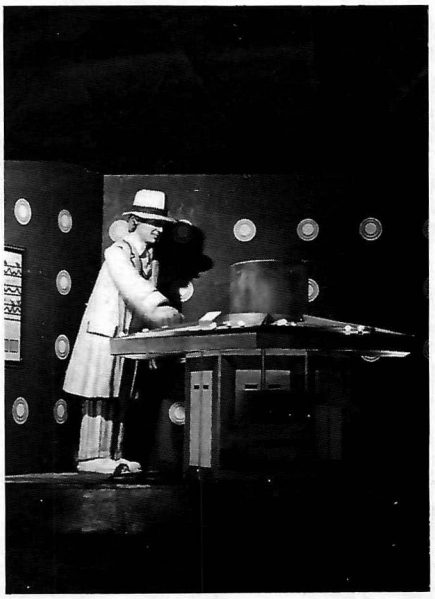


Soviet 'shuttle'

Further to the items that appeared in VOYAGER's *Summer* and *Spring* issues about the Soviet shuttle tests, we have been able to obtain some of the photographs actually taken by the Royal Australian Air Force. They show the sub-scale shuttle, very similar to one of the American lifting-bodies, floating in the Indian Ocean. This test vehicle, reckoned to weigh 2000 lbs, is thought to be the forerunner of a larger 40 000 lb craft. This would presumably replace the *Soyuz* and *Progress* craft only, for it is still nowhere near the size of the Rockwell Orbiter. This would therefore lend weight to the rumour of a much larger Soviet shuttle under development which would be at least the size of the US equivalent if not larger. Rumours of liquid-fuelled boosters have also been suggested, as has the fact that the main engine could be attached to the external tank, not the orbiter, and consequently be non-recoverable.

The pictures show the large cone, used for location in the sea, as well as the two angled wings and the small vertical fin. The nose, and particularly the cockpit window area, is very similar to the Rockwell Orbiter, and the space behind the cabin would presumably allow for a reasonable payload.

The Soviet ships for this exercise consisted of a *Kara* class cruiser; a *Kashin* class destroyer; three pace-recovery ships, a space-event ship and a missile-range instrumentation ship. The surveillance was carried out by the Royal Australian Navy's ship HMAS *Moresby* and a RAAF Orion aircraft.



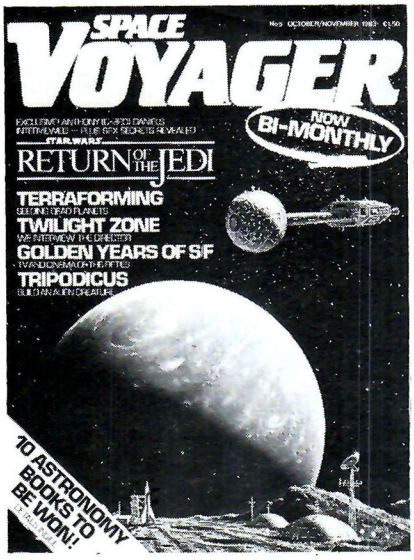
Pride of Blackpool's famous Illuminations is the new Dr. Who Tableau which lit up on August 26. November sees the 20th anniversary of the series and a special 'Dr Who' feature will be presented in the next issue of your favourite magazine. Photo: Blackpool Corporation.

Who's lit up then?

How do you turn Tom Baker into Peter Davison? Well, if you're Blackpool Illuminations you whip off his scarf, do a paint job on the body and give him a head transplant. The illuminations department has brought their 100-foot Dr Who tableau right up to date with the change of Doctors for this year's 'Greatest Free Show on Earth' which lit up on August 26. Now it needs changing again!

But some extra work was needed on the Doctor, last seen in public with sundry foes at Longleat for the Doctor's anniversary party, when all the giant fibreglass figures were lent to the BBC by Blackpool Corporation – the good Doctor had lost his celery sprig! Blackpool is developing short break holidays this year so that, with the BBC's Dr Who exhibition still thriving on the Prom, an autumn weekend in Britain's premier holiday resort would be something to think about for fans. More details from the tourism department, 1 Clifton Street, Blackpool, Lancashire. WG

SPACE VOYAGER BACK ISSUES!



Space VOYAGER
ISSUE No. 5 October/ November, 1983
Additional copies are now available from the editorial address.

Contents:
RETURN OF THE JEDI – SFX secrets revealed!
TERRAFORMING – Seeding dead worlds.
TWILIGHT ZONE – We interview Joe Dante, director.
SHUTTLE UPDATE – The *Enterprise* at Stanstead and more on *Challenger.*
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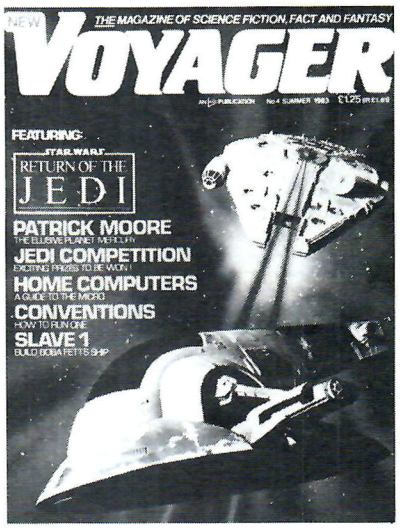

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SHUTTLE UPDATE – The latest news
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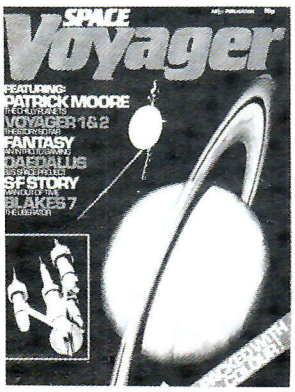

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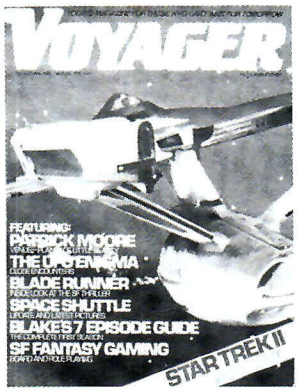

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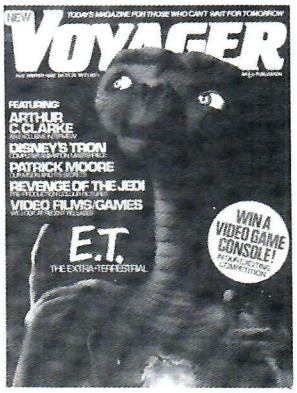

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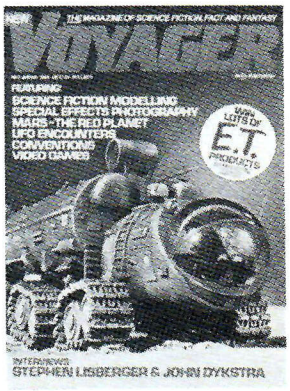

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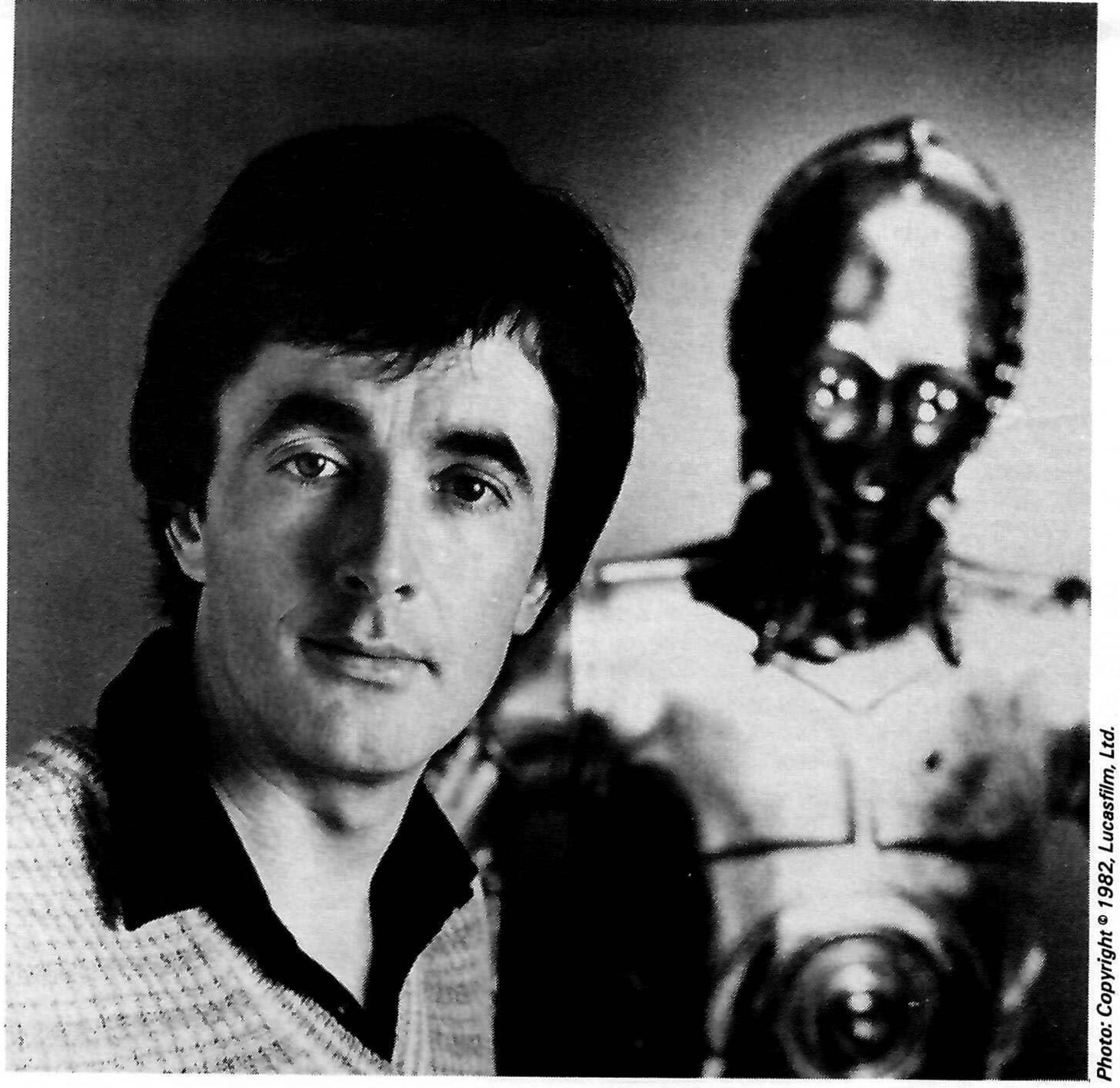


Photo: Copyright © 1982, Lucasfilm, Ltd.

'A GUY ACTING IN A GOLD SUIT'...

RANDY AND JEAN-MARC LOFFICIER TALK TO ANTHONY DANIELS

For two years before the *Star Wars* saga burst into his life, Anthony Daniels had gained a reputation as a skilled and talented actor playing strictly human beings on radio, television and stage. Thus, he is amused that the widest acclaim he has received so far in his career is for playing C-3PO, the lovable, talkative 'golden droid' of George Lucas' saga.

The overwhelming popularity of C-3PO took Daniels and the *Star Wars* film-makers by surprise since, originally, Daniels was not even supposed to dub the droid's voice. Both were delighted to discover that the fact that there was indeed a very human actor inside C-3PO did not detract from the character's appeal.

Daniels has portrayed C-3PO in all three chapters of the saga, but also in the American National Public Radio's adaptations of *Star Wars* and *The Empire Strikes Back.* Courtesy of his friend, composer John Williams, he has also conducted the Boston Symphony Orchestra and the London Symphony Orchestra, again as the multi-talented droid.

Born in Salisbury, Daniels first studied law and then management, in order to satisfy his family. Such studies, however, did not satisfy *him* and, upon admitting that acting was his only true love, Daniels spent three years in drama school. During that time, he won the 1974 BBC Radio Drama Award, which gave him his first contract and much of the experience he needed to create C-3PO's voice.

After several out-of-town theatre appearances, Daniels joined the touring Young Vic Company in their productions of *Macbeth, Much Ado About Nothing* and *Rosencrantz and Guildenstern Are Dead.*

Following his success as C-3PO, Daniels has appeared on the stage in Diane Cilento's production of *The Streets of London.* He has also played in James Kirkwood's *PS Your Cat Is Dead,* JB Priestley's *Dangerous Corner* and provided the voice of the elf Legolas in Ralph Bakshi's animated *Lord of the Rings.* Much of Daniels' spare time is spent writing children's plays and musicals for BBC Radio.

The slightly-built Daniels was available to present a stage performance at the 1983 *Ultra-Con* in Los Angeles. He took time out of a busy schedule to tell us about his experiences on *Return of the Jedi* and the other *Star Wars* films.

It becomes obvious on meeting Daniels that he is the consummate theatrical professional, giving advice with good humour to make sure that everything about his performance (including this interview!) would be properly prepared. His good nature and goodwill were also apparent at all times.

SPACE VOYAGER: Do you appear at conventions often?

ANTHONY DANIELS: No, I appear at maybe two or three conventions a year, because they take quite a lot out of you. In my case, I give a two-hour one-man performance. It's called megalomania, because it's just me alone on stage, no other actors. Luke Skywalker is in another galaxy, Princess Leia is somewhere else, it's just me.

The reason I do it is because, basically, I'm a stage actor. To me, this combines the two elements of my career, where one side is stage and the other, of course, is doing these movies.

The other reason I come is to be able to talk to the fans about all the ways we do things in our three films, including *Jedi* now. It's great to be able to tell the secrets about this new movie, by the way.

V: Do you like reacting with the fans?

AD: Oh, yes! Because when you do a film, you can feel very lonely. You have the script and you work alone in your sitting room at home at night. Then, you get to the studio, and all the things you worked out . . . Like, there's a piece in *Jedi* where they said to me the night before, 'Tony, when you come in tomorrow, we want you to mime the whole *Star Wars,* the whole of *The Empire Strikes Back* and as far as we've got on the script of *Jedi.* So, see if you can work out what you're going to do . . .'

So, I went to my sitting room and I moved the furniture – I nearly said the scenery, you can tell I'm an actor, can't you? – and I kind of

wrote out the sort of things I would like to do. Then, I tried to do them. I tried to mime being a Walker, I tried to mime the Death Star, a lightsabre. Then, I got into the studio, and of course the costume restricted me so much in what I could actually do. But, homework is one of the things one has to do. It can get pretty lonely sometimes.

V: I'm glad that you brought that scene up. Did you do all the choreography for that yourself?

AD: Yes, I did. Originally it was longer, but obviously in a film that's already over two hours, you're way on the edge of losing people's interest. So, bits of it were cut out. We kept the main pieces of it, however. Of course, the joke was also that C-3PO can not only speak 'Ewokese', but he also can make these noises of the lightsabre or the spaceships.

You have to find a way in that costume, without any finger movement and with very little hand movement, to create all this. Actually, it's one of the moments where I quite like what I did. There's a lot of moments in these films that I don't like. It was awful sitting there on the first night I saw *Jedi,* because there was nothing I could do. Not only was the screen nearly a hundred yards away from me, but even if I had got there with a pair of scissors, all I would have been chopping up would have been the actual screen itself. The celluloid print was already being shown in thousands of theatres all over the world . . .

It's very difficult. But, I suppose it's just as difficult when you're in the studio and the technicians are just watching you. Even with that scene with the Ewoks, which comes out on film very nicely. When you spend a whole day doing that, the crew is bored to tears with it. They watched me doing it from every angle. The technicians really wanted to have lunch, they didn't want to have to watch this Ewok scene again! So, you don't get any reaction in the studio. Whereas here, at a convention, for instance, people can really show their feelings. I love adulation! Sick, isn't it?

V: Have you had mime training? Because all of your movements as C-3PO, since you have no face, must get your intent across with body language.

AD: Yes. The reason I got the job in the first place, very much against my will, because I didn't want to play a robot, was because I was really quite good at mime in those days. They needed somebody who was not only physically quite small, but who could move. You know, mime isn't just necessarily doing all these hand movements (Daniels mimes pushing against an invisible window). I don't know what you call it; boring, basically! Mime is kind of good if you use it in conjunction with other things. Mime is movement really, and to me it's a good, integral part of acting. Certainly, C-3PO is made up of that and obviously the vocal attitude is very important. I'm not so good at mime now, because it's hard work and takes a lot of practise.

But, C-3PO sort of happens. When I get in the costume, C-3PO just takes over. I actually don't have to think too much now about what to do, it sort of happens. So, it's kind of nice sometimes.

V: You mentioned that you were against the idea of playing a robot at the beginning. Have your reservations changed over the past seven years?

AD: Oh, yes! Well, no, some of them have stayed! Some of them have to do with thinking that it was a really big mistake, because there are some people have no regard for an actor who is willing to do that kind of part. They assume he can't be an actor, because no actor would act with his face all covered up.

But, I changed my mind when I met George Lucas, because . . . you know how endearing the Ewoks are in the movie? Well, George looks like an Ewok. You walk in and you think, 'Hey, I like him, he's nice.' I enjoyed meeting him. There was also a painting about how C-3PO would look. It was a Ralph McQuarrie conception of the robot. It was just this little figure on the moon, and it was so sad and plaintive, and had a kind of wistful quality about it, that it really appealed to me. I wanted to sort of rush onto that moon and put my arm around him and say, 'It's OK!' C-3PO has this quality that he really needs to be . . . he really needs to be with me, I think!

V: Did George give you the opportunity to help formulate C-3PO's character?

AD: Oh, yes! In fact, it got a bit out of hand, because he did leave me a lot of freedom. You see, if you're sensible as a director, you hire an actor and for this you're getting a pair of legs – if you choose the right actor! – and a couple of arms and a face. But, also you get a brain, not with every actor, but with quite a few, and you might as well use it. You're not paying extra for the brain! Once in a while, the actor will say, 'You know, in this scene I think we might try that.' A sensible actor will not say that too often, but he would make it clear that he has an idea. A sensible director will then listen. If the actor is an idiot, of course, he just says shut up! But, a good director will always listen to the free brain of the actor and often accept his suggestions.

. . . 'When I get in the costume, C-3PO just takes over. I actually don't have to think too much now about what to do'. . .

With C-3PO, the thing was that I kind of got carried away, so I completely changed George Lucas' idea of how this robot should be. I didn't realize just how much I was changing it. It wasn't out of rudeness, it just happened. When George went back to America with the tapes and film, he then tried to re-voice the character. Because we have to re-do the voice every time. When we do the film, I have a radio mike, but it's very poor quality. So, in order to make the film, we have to dub it afterwards. Now, George tried to dub it with different actors. I suppose I was a bit sad when I heard that. But it's his film, so I couldn't complain at all. Yet, I was kind of sad that he really didn't like what I had done. Then, a few months later he rang up and asked if I could come and do it.

Six years later, when we were dubbing *Jedi,* I finally asked him, 'Why didn't it work with other people?', and he said, 'Well, nobody cared as much as you do.' I think that's really nice.

V: How did having a different director for each of the films affect you as C-3PO?

AD: George's direction, it's no secret, consists of saying 'Action' and 'Cut', all in a very low-key way. He doesn't appear to take much interest, and he's not very good at talking to actors. He admits this. He hates actors, I mean, anyone in their right mind would! He doesn't appear to give too much, but of course, he made *Star Wars,* so you can tell how much he does give, *in toto.* The whole thing *is* just him.

Irvin Kershner, on the other hand, was something else. Because the costume didn't work very well on the first movie, George cut C-3PO out of the *Empire* script a lot. Although the character worked very well, you couldn't afford that much time with the costume breaking and so on. So, he removed C-3PO a lot from the script. What nobody had told him, was that the costume had been totally re-made – and at huge expense, $200 000 just to re-make it – just for *Empire.* It looks the same, but it really isn't. That costume worked fine, I even tap-danced with it on *The Muppet Show!* (I'll do anything for money – except porno!) Consequently, the costume worked fine and I could do all sorts of things.

Then, of course, Irvin Kershner took over. I was in a scene and Kershner suddenly saw what I did, and could do. He hadn't known what I could do before because he didn't realize how C-3PO works. He had seen *Star Wars,* of course, but he didn't know the difference between the two costumes. So, he looked, and his eyes opened wide, and from then on, every shot he would say, 'Tony, you're not in the scene, come in the scene!' It was great, because I felt very much loved and felt good about it. Kershner was very enthusiastic, and that's exciting to be with.

What the outcome is, of course, is that C-3PO didn't really have a reason to be in these scenes, and he ended up really, like a painting on a wall. If you want a decoration, you buy an oil painting and you stick it on the wall. Well, C-3PO in a lot of scenes was a talking oil painting.

So, I had a long discussion with George Lucas afterwards – it sounds very grand, as if I'm name dropping, doesn't it? I had a long discussion with him about that, and about the function of a machine. If you're going to have a machine, you should use it. If you're going to have an automobile in a film, somebody should drive it. The same with C-3PO, if you're going to have somebody who has all these translating abilities that he boasts about so frequently, then you should see them displayed. C-3PO is an odd mixture of modesty and outrageous self-obsession. I said to George that really he should do this translation thing that C-3PO's talking about all the time.

Then, I said to him that I visualized C-3PO as someone who might lead an army, but only because originally he was trailing along at the back, and they all turned around and suddenly he's at the front. Of course, when you see *Return of the Jedi,* there's C-3PO, idolized, and in charge of all these little Ewoks. And, of course, he gets to speak all these outrageous languages, which were great fun to make up.

V: Did you make the languages up yourself?

AD: With Ben Burtt. He's the most extraordinary person on this film, and a lot of people don't realize what he does. But, if anybody plays R2-D2, it's basically Ben Burtt,

because he's the guy who makes up all the beeps! They're put on afterwards. Otherwise, R2-D2 is really just a little machine that's totally silent. The same with the Ewoks and Jabba the Hutt. Ben created all these languages. Now, for my scenes, we got together and we would say lines to each other. We listened to recordings of Tibetan, all that kind of thing, then we would write down words, and I'd say anything that we thought sounded good.

V: Was it difficult to come up with enough to fill large segments of time?

AD: No, because there aren't really large spaces of time. The odd thing that you don't realize when watching the movie is that there's only about 20 minutes of dialogue in an over two hour movie. The rest is all sound effects! So, it's only when we do the radio serial that we get into real trouble. Fortunately, there's a guy called Brian Daley who does a stunning job on inflating that 20 minutes to fill 13 half-hour episodes. Of course, we still have sound effects, but C-3PO's speeches wind up much longer, which is really difficult for me, because doing his voice is not easy. So maybe if we do *Return of the Jedi* on radio, as I hope we will, you will be hearing much more of this strange Ewok talk.

One of the reasons Mark Hamill and I do the radio shows, by the way, is because, well, first of all, I love radio. I think it's far better than film or TV. It's much more stimulating, it really allows the audience to use their minds. Then, Mark Hamill, George Lucas and myself, really believe in giving something back, because you don't have to pay to listen to the radio. Anybody can tune in free, and listen to *Star Wars*.

V: Do you feel that you act in a different way on radio?

AD: No, because I'm very used to radio acting. You'd laugh if you saw me doing it, because I stand there, in front of the microphone, just as I do when I'm dubbing, and I have to stand there like C-3PO, a bit angular, in order to get the kind of inflections and the kind of attitude that he has. It looks very odd, because there's a guy acting in a gold suit, without the gold suit.

C-3PO and R2-D2 remain the most endearing characters of the 'Star Wars' saga. Although we never see his face Anthony Daniels still manages to convey a surprising number of emotions for his alto ego, the golden droid. Photo: Copyright © 1980, Lucasfilm, Ltd.

V: How do you feel that being C-3PO has affected your career?

AD: The only effect that it's had, has been to take me away from other things. The time spent on *Star Wars,* etc., takes away from the time that is available for other things. It's called opportunity cost. You can't do two things at once. It really doesn't impinge in any other way. I have two very separate careers, one is C-3PO's as I've said, and the other is a very normal television and stage career.

V: In between *Star Wars* films, you must have other projects that you work on?

AD: Oh, yes. Before doing *Jedi,* I was in the longest running ever production of *Dangerous Corner* by J B Priestley in the West End in London. Before that, I was in a play called *Streets of London* which was very popular in the 1800s. It was the *Star Wars* of its day really.

When I get back from this trip, I'll be doing a TV serial for a television company in England. So, the two don't really go along. If I am playing a Victorian gentleman, it's not very important that I also play C-3PO. In fact, the two stay apart. That's the way I like it.

V: Has playing a character with lower visibility than, say, Harrison Ford or Mark Hamill bothered you?

AD: Well, I get a huge amount of recognition now. For example, the other day I was returning a rental car near the Chinese Theatre in Hollywood. There was a guy on the phone, and another fellow there who was adding the figures for the car. He nudged the first guy and pointed at me. So, the one from the phone asked if he could have my autograph. I said sure and got out my pen, then he said into the phone. 'You'll never guess who's signing my t-shirt at this very minute – Dudley Moore!' Well, I didn't sign his t-shirt! Everyone thinks I'm Dudley Moore, wherever I go, which is fine!

The recognition thing used to bother me. Originally, **Lucasfilm** tried to pretend that C-3PO was a machine. They didn't want to spoil the image. It was quite hard to take at the time. But they finally explained it. Now, they've found out that people don't really mind. They're really quite interested that somebody is willing to do this for a living. There aren't too many crazy people around. So, things have changed and I do get recognition.

But, at the same time, I wouldn't give away my privacy. A lot of people don't realize how nice it is to be able to walk into the supermarket and not be hassled. There's only so many times you can sign an autograph during lunch and not get indigestion. I think I have the best side of it.

V: If there are six more *Star Wars,* will C-3PO appear?

AD: Rumour has it so. All the plans are very, very loose because everyone is going to take a break, including the audience. If research shows, as it already has, that *Jedi* is a success, and if some more films are made, they would be made three or four years from now, which means that they would appear in five years from now. We'd probably make three together to cut down on production costs. Probably, possibly, perhaps, C-3PO would be there in a slightly different galaxy, with Darth Vader as a brat in shorts and Luke Skywalker as a twinkle in his father's eye *(sic).* It's that kind of thing, but the plans are so remote at the moment. I think we ought to be happy with *Jedi* for the time being . . . *

PROJECT CYCLOPS

IS ANYONE OUT THERE? Dr JK DAVIES OF THE UNIVERSITY OF LEICESTER'S ASTRONOMY DEPARTMENT SEARCHES FOR EXTRA-TERRESTRIAL LIFE

In the summer of 1971, a group of American scientists and engineers met for a six week study at which both experienced and newly qualified specialists set out to assess what would be needed to discover intelligent life outside the Solar System. The results of this study have become a classic example of how a serious examination of what is possible, combined with an imaginative approach to a problem, can produce a truly remarkable idea. The group proposed the construction of a huge array of radio telescopes to sweep the sky under computer control, searching for messages from the stars. The name chosen for such a project was that of the huge, one-eyed giant of mythology; it was 'Project Cyclops'.

Look . . .

If intelligent life does exist on other planets, the group was asked, how can we search for it in a way which will be thorough, with a good chance of success, and yet be technically feasible and not too expensive? Before settling on the use of radio telescopes the Cyclops group examined several alternatives, the first of which was to determine if it would be possible to go out and look ourselves.

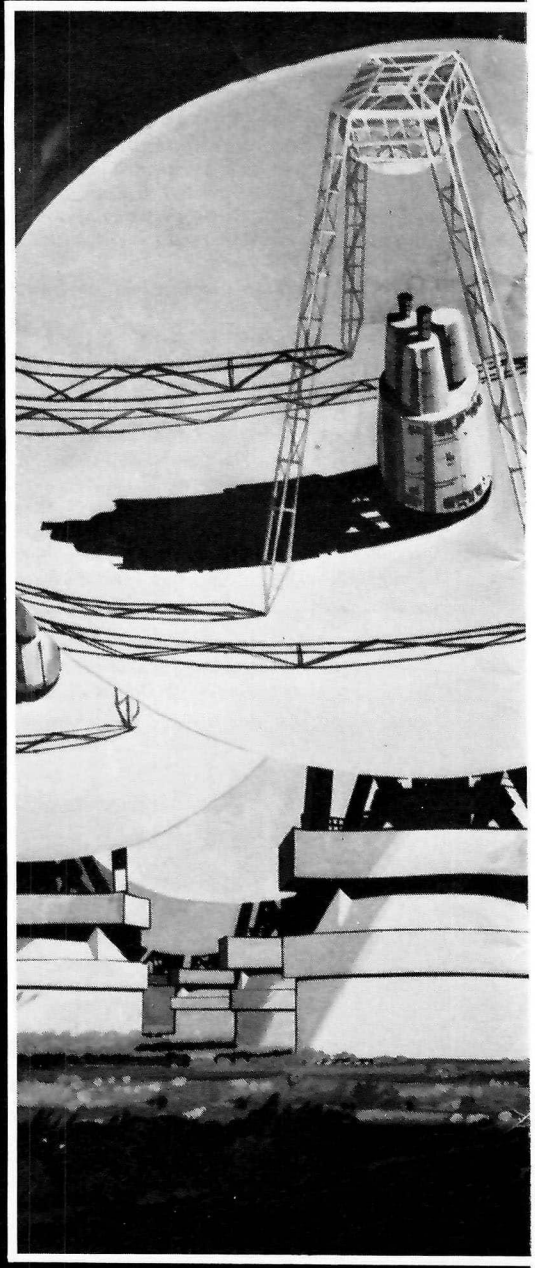
The five year mission of *Star Trek's Enterprise* is to seek out new life and new civilisations but the immense distances between the stars make this impossible with 20th century technology. It will probably be centuries before mankind is able to search the galaxy in person. A cheaper alternative might be to send unmanned probes like the British Interplanetary Society's *Daedalus* starship towards suitable stars which have planets. The probe would be programmed to enter orbit around the star and then to listen out for any radio signals of an artificial nature. If such signals were detected the probe would attempt to attract attention, possibly by repeating the message it has received back to the source, or by broadcasting some obviously artificial signal on a similar frequency. Such an explanation was proposed for long delayed echos of terrestrial radio messages but other, less controversial, explanations have also been found. Unfortunately the cost of sending out probes to all the likely stars in Earth's vicinity would be far too high, and the results too uncertain, for such a project to be attempted at present. In short, interstellar spacecraft are only likely to tell us about extra-terrestrials if they are launched from somewhere 'out there'!

. . . or Listen?

Since direct exploration seems to be ruled out it appears that our only chance of discovering intelligent life beyond Earth is to look for signals which they might be beaming towards us. These signals could be of two types: either beacons deliberately trying to attract the attention of other civilisations, or simply domestic signals which have leaked into space. Earth, for example, has no interstellar beacon but has been blasting out radio and television transmissions into space for over 50 years. Even today, extra-terrestrials could be watching Bilko, Lucille Ball or the first episode of *Dr Who*. To give the best chance of success, any search programme should be capable of detecting both types of signal, although interstellar beacons should be much easier to find.

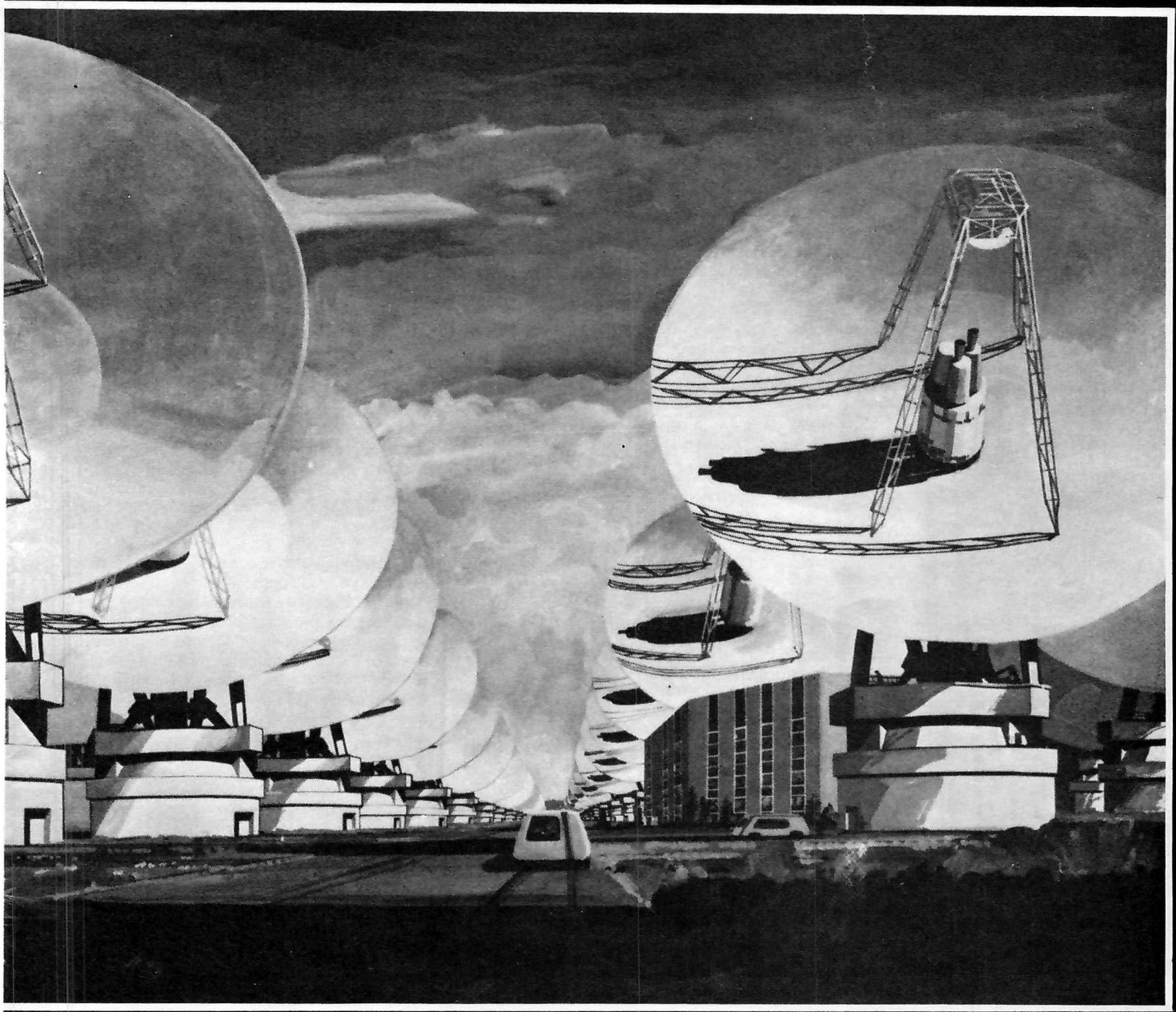
Although we normally regard radio signals as the best way of communicating over long distances we cannot assume that will always be true. Only a century ago the fastest way of sending a message 50 miles was by carrier pigeon, and soon our radio stations may seem just as outdated. Despite this, the Cyclops team decided that radio signals were the best means of searching for extra-terrestrials, although it is interesting to consider a few of the alternatives.

Laser systems may one day be widely used on Earth for communications, and could even be used over interplanetary distances, but absorption by the thin clouds of interstellar gas and dust make them unsuitable for use outside the Solar System. Furthermore, the narrow beam of a laser requires very accurate pointing at a specific target, making it unsuitable for a beacon, and less likely to leak accidentally into space. Beams of high energy cosmic rays could be a possibility, but these are distorted and deflected by the galactic magnetic fields and would soon lose their information content. The ghostly, massless neutrinos pass undeflected through space but precisely because they are so elusive it is difficult to imagine how a suitable receiver could be produced. Another possibility is the development, by genetic engineering, of a spore (or seed) which could survive many years of space travel and then reproduce on landing on another planet. Although this may one day be feasible it seems unlikely to have much guarantee of success, and in any event is hardly communication as such. Finally, it has been suggested that an advanced civilisation could use its own star as an interstellar beacon. This would be achieved by dumping thousands of tons of material into the star, causing it to emit unusual spectral lines which no other similar star would possess, and thus drawing attention to itself. Astronomers observing stellar spectra should keep this possibility in mind when examining their results.



Radio – The Logical Choice

The advantages of radio waves for communication, and the reasons for its selection by



The concept of Project Cyclops is represented by an artist's rendering of an array of radio telescopes antennae, each larger in diameter than a football field, which might detect signals from an extra-terrestrial civilisation. **Photo: NASA.**

the Cyclops team, include the ease with which they can be transmitted and received, the way in which they travel almost unhindered through interstellar space, and their ability to carry large amounts of information. Additionally, even if an advanced civilisation has passed beyond the stage of using radio communications they will still probably have radio astronomers, and most likely expect other intelligences to be using radio telescopes as well.

Unfortunately, to listen to a specific radio channel it is necessary to tune the receiver to the correct frequency and astronomers do not know what frequencies any extra-terrestrials might be using. There are so many possibilities that it is impractical to examine every start at every frequency and the Cyclops team set out to guess which would be the best part of the radio spectrum to monitor. Some radio waves are absorbed or deflected by Earth's ionosphere, others are swamped by radio emissions from stars and galaxies and so are unsuitable for communication.

By considering these effects the group decided that the microwave region, with wavelengths from three to 30 centimetres, offered the best chance of success. Interestingly, the hydrogen atoms and the hydroxyl (OH) molecules which are found in interstellar space both emit radio waves in this region naturally, and yet the wavelength band in between these signals is relatively quiet. The combination of hydrogen (H) and hydroxyl (OH) gives water (H_2O) and this quiet region is sometimes called the 'Water Hole'. Since, on Earth, animals of many different species come together to drink at terrestrial water holes some astronomers believe that water-based life throughout the galaxy would also meet at the radio 'Water Hole'. This idea is rejected by other scientists as too romantic and poetic but nonetheless the Cyclops team decided to search this region with extra care.

The Cyclops System

The Cyclops group estimated that to have a good chance of detecting extra-terrestrials the radio telescope required would need a surface area of between seven and 20 square kilometers. This corresponds to a radio dish about five kilometers in diameter! Obviously such a huge structure could not be built as a single unit here on Earth, and the cost of transporting the thousands of tons of material needed to assemble one in orbit is too high to be seriously contemplated. To make possible such a huge collecting surface requires the use of a large number of smaller radio telescopes linked together electronically. Using advanced computer techniques the signals from all of these individual dishes are combined to give the appearance of a single huge radio-telescope. Such a system is called a 'phased array'.

One advantage of a phased array is that it can be built up slowly, and expanded as

required by adding on more dishes. Even if the project was shelved halfway through construction the dishes already built could be used until money became available to finish the job. Since nobody is certain how large the final array might need to be this step by step approach is the most logical way of carrying out the project.

The Cyclops array was envisioned to consist of a thousand or more radio telescopes each about 100 metres across. Each dish would be positioned about 300 metres from its neighbours to avoid being blocked by them when looking near to the horizon. All the dishes would be connected to a control building located at the centre of the array by a series of tunnels carrying power cables and the links to the central computer. With the advances in microcomputers since the original Cyclops study it now seems likely that each dish would have its own micro to carry out routine tasks such as pointing the dish under guidance from a central master computer.

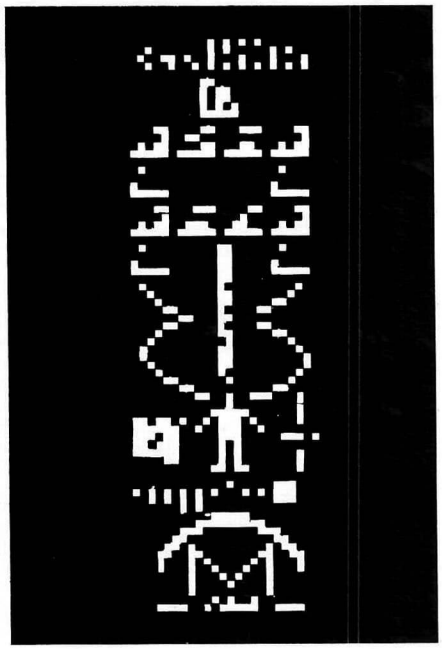
The siting of the Cyclops system will depend largely on political considerations because of the huge investments of manpower and materials required. Such a major project must be located in an area which is politically stable and possesses suitable technological back-up. Since the USA is likely to play a leading rôle in such a project the most likely site will probably be in the southern United States although if the whole project was to be organised internationally other areas are possible.

Wherever the site is finally chosen, it must have several important characteristics. It must be geologically stable since earthquakes, or land subsidence, would wreak havoc with the carefully-aligned radio telescopes. Even movements of a few centimetres would totally disrupt the signal reconstruction from the multitude of telescopes. The array must also be built in a dry climate, since water vapour in the atmosphere causes distortions in the incoming radio signals, and in an area free from high winds or snow falls which might distort the radio dishes. The site should be as flat as possible to simplify the signal reconstruction processes. One final, but very important, consideration is that the Cyclops array must be as far as possible from areas of human habitation and away from major air routes. The system will be very sensitive to interference from man-made radio noise and, unless carefully screened out, this noise will swamp any weak signals arriving from space. Ideally the site should be a high plateau, in a mild, dry climate away from civilisation and surrounded by mountains.

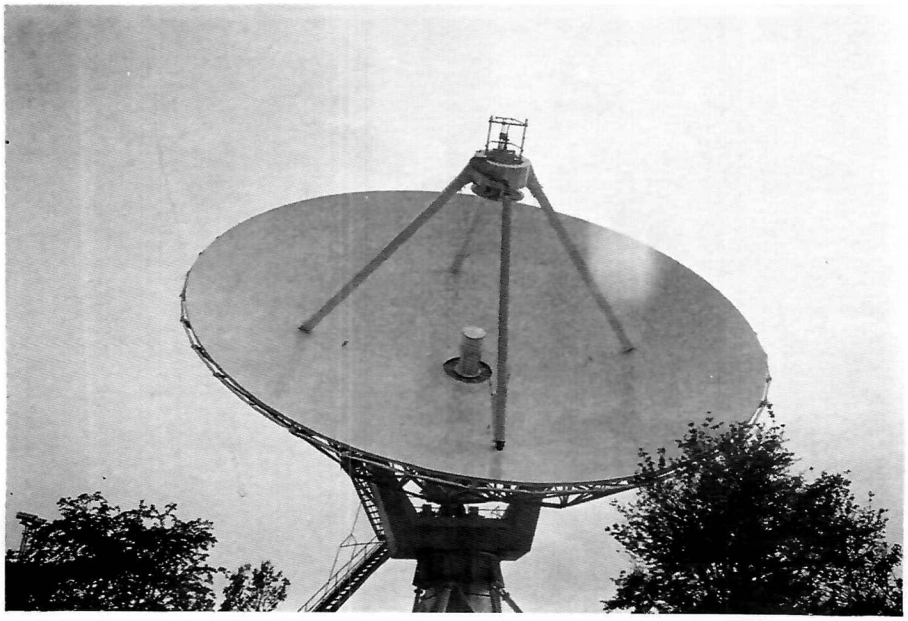
To cover as much of the sky as possible the array would be best built on, or near, the equator, since observatories in northern latitudes cannot see the most southerly stars and vice versa. This requirement could of course be waived if two arrays were built, one in each hemisphere.

The Cyclops array would examine stars individually for a short time before moving on to the next target. To give the best likelihood of success the stars chosen should be near to Earth, so their signals will be easy to detect, and of a type with planets on which life is likely to have developed. Regrettably no list of suitable stars yet exists so it will be necessary for the Cyclops project to compile a catalogue of likely targets. The huge number of stars which would need to be examined makes some sort of automatic survey highly desirable. The Cyclops study proposed that work should begin on developing an observatory which can examine stars and classify them automatically, sending the positions of suitable candidates direct to the computer controlling the Cyclops array. Data from stars of types unsuitable for forming habitable planets would be stored away separately for more general astronomical research.

The Cyclops radio search can be carried out both day and night and is almost unaffected by anything other than extremely bad weather. The optical telescopes, however, can only work at night, and when the sky is clear. This may make it necessary to build several of these automated observatories to support each Cyclops array. Even if the search for life was unsuccessful the spin-off for optical astronomers of these automatic observatories would be considerable.



Left, this pattern represents a string of 1679 on-off pulses, which, in 1974, were beamed by Puerto Rico's vast Arecibo radio-telescope towards the globular cluster M.13 in the constellation of Hercules. When arranged in a grid 23×73, the pulses form a pictorial message of numbers, atoms basic to life, and formulas for DNA (the molecule which includes genetic instructions). Curved lines, representing DNA's spiral structure, point out a human shape. Other information – Earth's population, human height, the Solar System with the Earth displaced towards the human figure; the Arecibo telescope (at foot) would perhaps be baffling! Below, the 25 metre Darnhall telescope at Winsford. Photo: Mat Irvine.



Cyclops as a Beacon

The Cyclops system was designed to receive signals from space but it would be a straightforward matter to convert it into a huge radio transmitter. As such, mankind could use the array as an interstellar beacon, signalling to suitable nearby stars and then after waiting for the correct amount of time, listening out for replies from those same stars. For signalling to nearby stars individual dishes could be pointed at specific stars, whereas the whole array would be required for signalling to more distant targets. Whether mankind would have the courage to operate such a beacon remains problematical. Some leading astronomers feel that even if the interstellar telephone rings it would be unwise to answer.

Cyclops for Research

Although designed mainly to discover life on other planets the Cyclops array could be used for a variety of other astronomical purposes. Within the Solar System the huge collecting area could be used to receive data from deep space probes, such as Voyager, much more efficiently than current Earth-based antennae.

The information that Voyager 2 will send from Neptune is limited by our ability to receive the signals, not by Voyager's capability to make measurements.

The array could be used to bounce radar waves off the planets, as is now done with smaller radiotelescopes. Cyclops could make radar maps of all the planets out to Pluto using only a fraction of its total observing time.

Studies of stars and galaxies could be revolutionised by the ability of Cyclops to see fine detail, and its sensitivity would allow faint objects to be studied. With such a powerful radio telescope objects at the edge of the observable universe should be detectable and studies of them could have a major impact on our understanding of the way the universe was formed. Thus, even if Cyclops never found any extra-terrestrials, it could play a major role in conventional astronomy.

The Story so Far

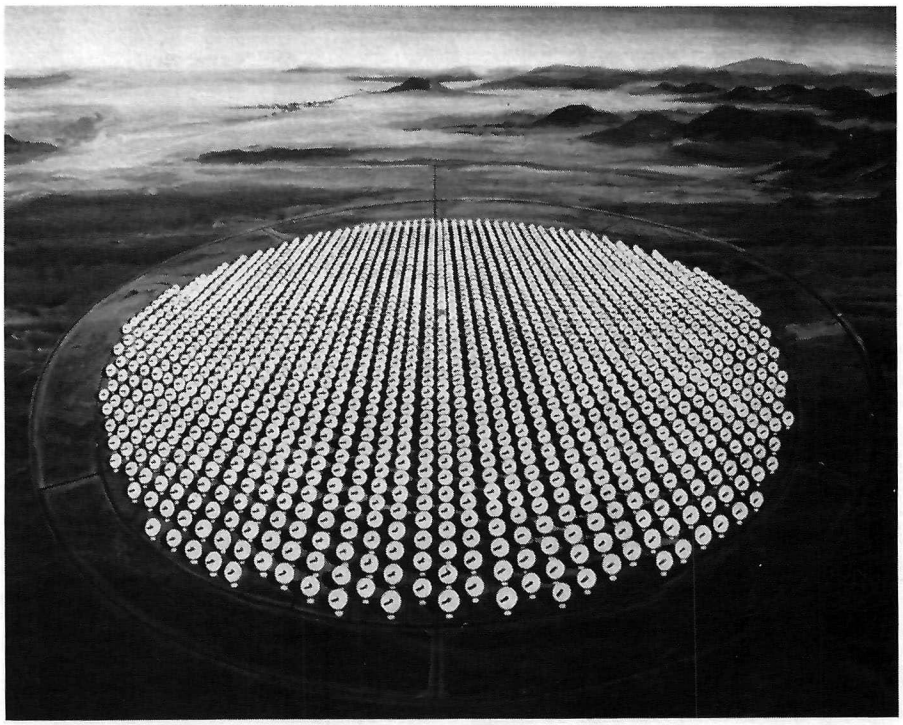
The Cyclops study was published over a decade ago and as yet there is little likelihood of such a project being undertaken. The democratic process operates over short periods with elections every few years and the political will to fund a programme which might last for decades, or even centuries, is lacking at the moment. However, a start has been made. The huge radio telescope at Arecibo has been used to transmit a message towards a globular cluster of stars in the constellation of Hercules. This cluster is about 30 000 light years distant so any reply cannot possibly arrive for 60 000 years, but the attempt, at least, is encouraging.

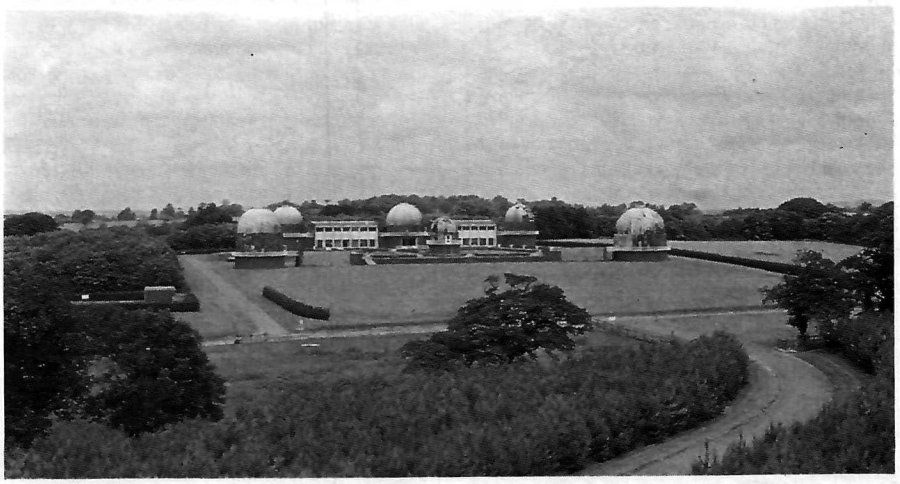
Most recently NASA has re-entered the SETI field after having their SETI budget cut to nothing by the US Congress, some of whom regarded it as a waste of money. A joint project between NASA and Stamford University, California will last until 1987 when it will be phased into a ten year search programme. The first phase will develop equipment, techniques and computer programmes for the search. An evaluation of various observing sites will also be made. It is expected that antennae of the Deep Space Network, currently used for tracking space probes, will be used for the project.

After completion of the first phase, the search programme will begin looking both at specific target stars and carrying out an all-sky survey. The target stars chosen will be stars similar to our Sun, *ie*, with spectral classes F, G and K and the wavelength region of the survey will include the 'Water Hole' region. Although much less sensitive than Cyclops this project will no doubt establish the basic technology and experience needed for a more detailed search in later years. It is interesting to note that Dr John Billingham, one of the leaders of the original Cyclops study will play a major rôle in the new project.

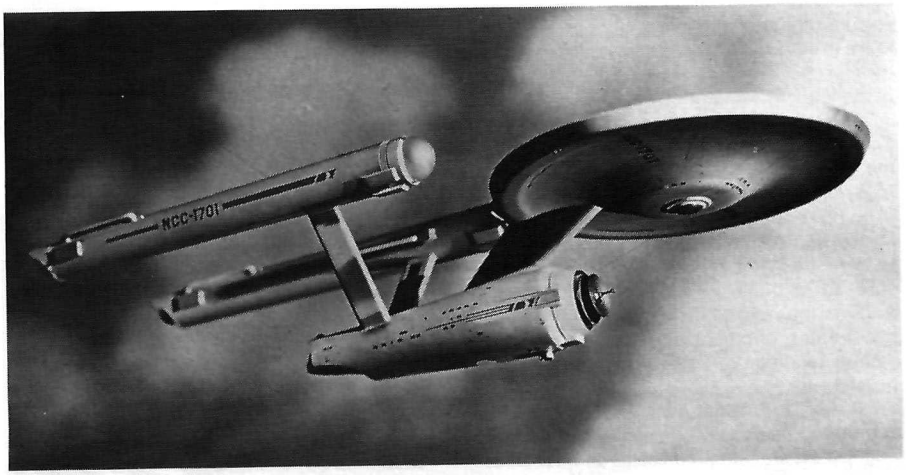
Conclusions

The Cyclops team concluded that the search for extra-terrestrial intelligence is a legitimate scientific project and that the technology now exists here on Earth to begin such a search. The effect on all mankind of the discovery of extra-terrestrials, or of such a search failing and confirming that we are alone, would be profound. Cyclops represents a unique opportunity for all nations to work together, for the benefit of all humanity, and answer the question, 'Is there anybody there?'.





Top, Project Cyclops was sponsored by NASA and the American Society for Engineering Education and was carried out by a team of university scientists and engineers working under the joint direction of NASA's Ames Research Centre and Stanford University. Photo: NASA. *Above, the Royal Greenwich Observatory's Equitorial Group photographed from the top of Newton by Mat Irvine. Below,... 'to boldly go where no man has gone before...' TV's USS Enterprise from 'Star Trek' whose mission is to explore strange new worlds and seek out new civilisations. For the foreseeable future, such vessels must remain science fiction...* Photo: BBC.



THE GOLDEN YI

You would need to be deaf, dumb and blind not to realise that we are currently in the midst of a small science fiction boom. But wait, I hear you cry. Small? How can the man use such a word when we are dealing with epics like *Star Wars, The Empire Strikes Back, Return of the Jedi, E.T.,* and *Superman?* If ever there was a science fiction boom, this must surely be the big one.

Wrong.

Sure those productions are big. They're lavish too. For sheer quality, they've probably never been beaten in the history of the cinema. But go back 30 years. The 1980s might have the *quality* but the 1950s had the *quantity.*

What happened to SF in the decade between 1950 and 1960 makes today's boom look like a splutter. During that time around 150 SF films were released in the English language alone. That's an average of more than one a month for ten years!

Films with never-to-be-forgotten titles like *Invasion Of The Body Snatchers, Forbidden Planet* and *The Day The Earth Stood Still;* others with much-better-forgotten titles like *Invaders From Mars, Cat-Women Of The Moon* and *Attack Of The Crab Monsters* . . .

Not just films either. SF featured strongly on radio and TV as well. I grew up in the 1950s and, like most of my schoolfriends, I was glued to the radio every Monday night to follow the latest adventures of Jet Morgan and crew in *Journey Into Space* while, on television, my parents were thrilling to the not-suitable-for-children exploits of Bernard Quatermass, a headstrong scientist who, in three BBC serials, managed to get himself into some very nasty situations, all with one thing in common: they scared the pants off a whole generation of viewers.

When you come to study this era, the majority of plots fall into four basic categories:-

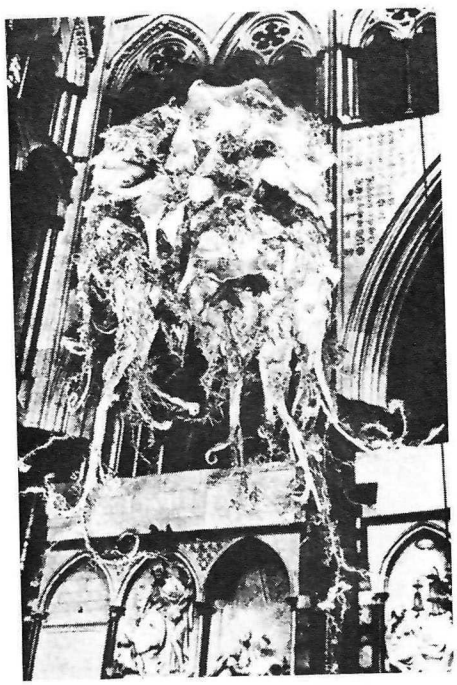
1. A Biblical Prophecy Come True In Our Own Lifetime. This is the straightforward End Of The World story; the situation from which it is absolutely impossible for the characters to have any form of escape. The world is going to end and that's that. Unless of course . . . and there is always an *unless* that is discovered in the last chapter of the book, or the final frames of the film.

2. The End of Civilisation As We Have Come To Know It. This isn't *quite* the end of the world. With just a few exceptions, every man, woman and child might have been struck blind, poisonous plants may well have uprooted and begun to stalk the countryside in search of victims, but a few brave souls have survived to build a new form of civilisation. And, as the hero and heroine stare from the final frames, or pages, into the last rays of the setting sun, they vow that *this* time things will be different . . .

3. My God, What Was That? Usually it's something that's very big, very green and very angry. It's a monster that has been woken from hibernation in the Arctic Wastes by some fool with an atom bomb and, once awake, it isn't content until it has destroyed at least one major city of the world. This plot usually contains an earnest scientist who thinks the monster should be kept alive, a beautiful girl with whom the monster is gentle, and an army general who wants only to blast the thing to kingdom come.

4. Daddy, What's That Strange Bump On The Back Of Your Neck? Also known as 'Charlie, What's That Strange Look In Your eyes?' and, 'Mummy, Why Does your Voice Sound So Strange?' Whether it's their voice, their eyes or nothing more than a funny bump on the back of the neck, Mummy, Daddy and Charlie all have one thing in common: they have been taken over by an alien being. This was a very common theme in some of the best, and also some of the worst, SF films of the 1950s, possibly because it was a lot cheaper for an ordinary actor to exhibit a glazed look/strange voice/neck bump than it was for the film company to actually *build* an alien being.

Over the next two issues of *Space VOYAGER,* we are going to take a look at SF of the 1950s, this month as it was seen and heard on radio, films and TV; in the next issue, as it appeared in books, comics and magazines. In the space available, the list can by no means be definitive, especially in the film section this month. So it has to be selective. And, in making it selective, I have also made it subjective.



The monster begins to take over Westminster Abbey in BBC Television's 'The Quatermass Experiment' (1953). Photo: © BBC

These, for one reason or another, are my personal favourites: one man's meander through the golden years of SF.

Radio: Britain's largest listening audience

At the start of the 1950s, few British homes had television. For the first few years of the decade, at least, the majority of people relied for their evening's entertainment on the radio; or, as it was known then, the wireless.

In the opinion of many, there has never been a better medium for science fiction. Pictures conjured by the mind often far exceed the skill of set designers who, in the cinema, would need to scout the world for a location, adapt it to their own needs, build their sets and add complicated SFX just to show the audience an alien landscape. On radio, a few lines of descriptive dialogue and listeners of the 1950s, unfettered by today's reliance on visuals to stimulate tired imaginations, were there.

In the studio, two actors might stand in lounge suits before a microphone, but in the minds of the listeners, two astronauts stood vividly in an airlock, poised to take their first steps on a new world.

Radio SF plucked its listeners from their armchairs and transported them in impossible spaceships to incredible worlds with only the reality of the nine o'clock news to bring them back to earth.

On Radio Luxembourg, there was Dan Dare, the comic-strip hero from *Eagle* fighting fiends from 50 galaxies, and on BBC's *Children's Hour,* there was Angus MacVicar's unlikely tale of the lost planet Hesikos, to which journied an unbelievable band of astronauts that included a 17-year-old called Jeremy and the family's housekeeper, Madge, who immediately after take-off (from Scotland, by the way) could usually be relied upon to make for the ship's kitchen to make the crew a nice cup of tea.

The Lost Planet and *Return To The Lost Planet* were, to say the least, a little far-fetched, but they were good entertainment. Both later enjoyed success on children's television and were published in hardback books, printed and reprinted throughout the decade.

Dan Dare and the 'Lost Planet' stories were aimed squarely at a young audience, but the biggest radio SF success of the time was aimed at everyone from eight to 80. It started in the mind of a young radio producer who had already made his mark with projects including the BBC's first ever jazz programme and the scripts for a western series called *Riders Of The Range;* it went through a sticky patch in which it was condemned by BBC officials and critics alike; it ended with an audience of 5 000 000, the largest UK radio audience of the time.

The programme, first broadcast on September 21, 1953, was *Journey Into Space,* its creator was Charles Chilton.

Today, Charles Chilton is what might be described as one of nature's gentlemen, a

EARS OF S-F

PART ONE: SIGHT AND SOUND

JOHN WADE'S NOSTALGIC LOOK AT CINEMA, TV AND RADIO

kindly man who exudes the air of everyone's favourite uncle. He has fond memories of *Journey Into Space:*

'I never thought the series would take off quite the way it did,' he told me when we met recently at the BBC Club in London. *'In fact, after the first three episodes, the Head of the Light Programme called me to his office and said it would have to come off. It couldn't be any good, he said, because he had asked his grandchildren and they didn't like it.*

'I reminded him that we had to run for at least eight weeks because of contractural agreements. He let it run and, by the time the eight weeks were up, it had become one of the most popular series on radio. They told me to keep writing.'

In the end, *Journey Into Space* ran to three series, with a total of 54 episodes. It was sold to 58 countries, translated into languages from Rumanian to Hindustani; turned into three books that were translated into half-a-dozen languages; and, some years after the final episode, was continued as a comic strip, published in *Express Weekly.*

So what was the secret of its success? For a start, it was as accurate as it could be for its time. As technical adviser, it had Kenneth Gatland, a Farnborough rocket designer: *'All our rockets took off at the right speed,'* Charles boasts with the pride of a writer who has no scientific qualifications other than an amateur's interest in astronomy.

But perhaps the biggest reason for the programme's popularity was the sheer believability of the characters, ordinary human beings thrust into strange situations. The crew consisted of Captain Jet Morgan, designer Stephen 'Mitch' Mitchell, Doc Matthews and – everyone's favourite – cockney radio operator, Lemmy Barnet, a character based largely on the actor who played him, Alfie Bass.

The other actors were Andrew Faulds (Jet), Don Sharp (Mitch) and Guy Kingsley Poynter (Doc). Many of the other characters were played by a young man just making his mark as an impressionist. His name was David Jacobs. He it was who, at the start of every episode, announced in earth-trembling tones, *'Journey . . . Into . . . Spaaaaace.'*

During the three series, the crew travelled to the moon in their spaceship *Luna* and later to Mars in the *Discovery.* They became involved with alien beings, time travel, hypnotised Earthmen living on Mars under the impression they were on Earth, the last Martian who turned out to be a giant and whose race was responsible for the giant myths on Earth, a talking machine which today would be called a computer, a Martian invasion of Earth . . . and much, much more besides.

And it was all so real. At the end of every episode, 5 000 000 listeners sat on the edges of their seats, dying to know what would happen next. What none of us knew at the time was that the outcome of the latest cliff-hanger was as much a mystery to the author as it was to his listeners.

Dr Morbius (Walter Pigeon, left) commands Robby the Robot to kill the captain of the rescue ship. Will the laws of robotics allow him to do it? All was revealed in 'Forbidden Planet', made in 1956. **Photo: © MGM**

'I never had any real plan for the way the stories were going to turn out,' Charles told me. *'I just wrote from week to week. Usually the muse would strike on the Friday night before each Monday night's broadcast.*

'I did once write an episode a week in advance, but I tore it up on the Thursday and started again. I think if I'd realised then how seriously people were taking it, I'd have been terrified.

'Despite that, I really believed in the series while I was writing it. I used to go out to my observatory and look at the spot on the Moon where I imagined they all were. What's more, so did the cast. They often came round to look through my telescope at the spot where they were supposed to be.'

Dedication indeed, especially when you consider that Charles was never paid a penny from the BBC for writing the series:

'I was under contract as a producer,' he said. *'If you were so filled with the urge to write that you couldn't help it, the BBC didn't stop you. But they paid me for being a producer, not a writer.'*

Journey Into Space is undoubtedly one of the great success stories of British radio, but it wasn't without its critics. The official who wanted it taken off right at the start saw the error of his ways, but the editor of the *Vargo Statten Science Fiction Magazine,* writing in his February, 1954, issue, had this to say of the first series:

'The BBC serial Journey Into Space *has ended at long last; starting with a too remarkable likeness to the film* Destination Moon, *it was apparently lengthened by popular request until the later instalments were little but sheer padding, and it was plodding on with the grim tenacity of a spaceman under 3 g to its inevitable end . . . complete exhaustation* [sic] *of ideas, freshness, realism and interest. Surely the BBC could have found an SF author to script an SF serial?'*

Today, mention vintage radio programmes to any man in, or approaching, middle age and the conversation will inevitably turn to *Journey Into Space.* It is frankly amazing just how many people remember the series and how much affection they still hold for it.

I wonder how many people remember *Vargo Statten?*

Films: Three words that saved the world

Three things helped to shape the boom in

cinema SF in the 1950s. First, the Second World War that ended in 1945 had brought home the very real advances made in scientific research in general and the atom bomb in particular. Second, the Cold War that was still continuing sharpened, especially in America, the public's awareness of Communism and the fear of being 'taken over'. Third, the first 'modern' flying saucers were spotted in 1947 and regular sightings were reported from then until the middle fifties. Put these three factors together and you have the major themes behind most of the decade's films.

The film that is largely reckoned to have been responsible for starting the boom (though it would probably have happened anyway without it), was *Destination Moon,* made in 1950 by George Pal and based loosely on Robert Heinlein's novel, *Rocketship Galileo.* Heinlein was one of its three screenplay writers.

Destination Moon was practically a documentary, concerning the first manned flight to the moon by Americans, primarily to prevent a certain foreign power (I wonder who?) from getting there first and establishing a military base. The film was as scientifically accurate as possible for its time, relying not only on Heinlein, but also on German rocket expert Hermann Oberth for technical advice.

The SFX were convincing, especially in the creation of the lunar landscape and a sequence in which one of the crew finds himself adrift in space. But at the end of the day, it was all rather dull.

Perhaps that dullness was the reason why, with only a few exceptions, producers of the day soon ceased using established SF authors to script their movies and turned instead to other writers who understood the mechanics of plotting rather better than they understood the mechanics of a rocket. The result was a lot of films that were vastly entertaining, but scientifically poor.

One of the better films of the time, and one that handles the alien take-over theme to perfection, was *Invasion Of The Body Snatchers,* a truly dreadful title for one of the best SF films of all time. It was directed by Don Siegel in 1955 and Sam Peckinpah was one of its co-writers.

The plot concerned the mysterious arrival of pods from outer space which gave birth to, and then replaced, human beings in the near vicinity. Made in black and white, the film combined the use of crooked camera angles, strongly directional lighting and powerful background music to emphasise the menace of the story.

The pacing throughout is perfect: we are 40 minutes into the film before we even see one of the pods, and by then we are ready for its true horror. And there is some wonderful dialogue.

'We can't close our eyes all night,' the hero, Miles Bennell tells his girlfriend Becky. *'We'll wake up changed into something inhuman. Only when we have to fight to stay human do we realise how dear it is to us.'*

Unfortunately, Becky doesn't fight quite as hard as her boyfriend. She sleeps and is taken over. Miles, not realising the truth, kisses her and, as he says later, *'I didn't know the real meaning of fear until I kissed Becky.'*

Invasion Of The Body Snatchers is full to overflowing with good, solid paranoia, as Miles battles to make himself believed, only to see more and more of his friends going under. The film ends on an upbeat as he eventually makes it to a hospital where his story is accepted . . . but that's not the way the director wanted it.

The story was designed to end with a scene, still in the film, but now some minutes before the official ending, in which Miles staggers, distraught from lack of sleep, onto a dark highway, ranting about the pods to drivers of speeding cars, trying to stop them, demanding help, endeavouring in vain to make himself understood as he cries to deaf ears: *'They're here already . . . you're next!'*

Another film which took alien take-over as its plot, but which completely failed to handle the theme with as much conviction, was *Invaders From Mars,* made in 1953. The best thing about *Invaders From Mars* is that it's so bad.

This time, Martians have landed on Earth and are taking over the inhabitants of a small town by swallowing them up through a whirlpool of sand, an event that happens in conjunction with the sound of heavenly voices oohing and aahing on the soundtrack in weird harmony. You'd be forgiven for believing that the voices are there only for effect, as part of the background music that never seems to cease in SF films of the 1950s. You'd be wrong. *'There's that music again',* says one of the characters just before the ground opens and swallows yet another victim, destined like all the others to be operated on below ground and to return a little later with a lack of emotion and a small bump on the back of the neck.

Invaders From Mars, its sets and camera angles strongly influenced by the fact that it was originally made in 3D, is a wealth of amazing dialogue. There is a lot of talk about rays. Just what, for instance, are the Martians using to build their underground fortress?

'Some sort of a ray.'

'Like an X-Ray?'

'Yes, some sort of radioactive ray that could smash through the Earth.'

Or better still:

'A transmitter that could manufacture infra-red rays could melt through the Earth.'

Once David, the traditional schoolboy hero, has spent the traditional first half of the film trying to convince the grown-ups that those bumps on the back of his parents' necks are something a little worse than gnat bites, the army arrives on stock footage to fight the Martians. Although . . .

'If they've got a ray down there, I don't know what good our tanks are gonna do,' comments one of the soldiers.

In the end, the day is saved by David who, having faced the head Martian – described as 'mankind developed to its ultimate intelligence', but who resembles nothing as much as a head with tentacles in a goldfish bowl – leads the troops through the labyrinth of underground tunnels built by the Martians . . . until they come to a dead end.

'If only we had an infra-red ray to burn through all this rock,' someone says. And as luck would have it, guess what they find a few paces on?

Invaders From Mars is a classic. It shouldn't be missed.

Two other films, also considered as classics, but for different reasons, were *Forbidden Planet* and *This Island Earth.* Both were major influences on future films and both were intelligently made.

Forbidden Planet was directed, in 1956, by Fred MacLeod Wilcox, best known until then for *Lassie Come Home.* It introduced Robby the Robot, a mechanical marvel that many believed to be a real automaton. In fact, like so many SF characters before and after him, he was nothing more than a man dressed up. But, as robots go, he was dressed to perfection.

The film's plot was actually an update of *The Tempest* and concerned a scientist, Dr Morbius, and his daughter, Altaira, marooned on a strange planet as the sole survivors of a colonisation attempt. When a rescue party arrives, they are not welcome and find themselves attacked by some 'dark, terrible, incom-

Opposite page; the cast gather around an ancient microphone and 'Journey Into Space' takes off for another episode. Left to right: Mitch (Don Sharp), Jet (Andrew Faulds), Lemmy (Alfie Bass) and Doc (Guy Kingsley Poynter). Photo: © BBC. ***Right, 'The Incredible Shrinking Man' (Grant Williams) rehearses a scene on the film's giant set, watched by director, Jack Arnold. The film was made in 1957.***

prehensible force' that is conjured up from the mind of Dr Morbius. The force, which takes the form of an enormous invisible monster, has of course torn all the previous colonists apart limb from limb.

High spots of the film are the attack of the monster, courtesy of an animator on loan from the **Disney** studios, and a tour of an underground city that shows special effects that were equalled in only one other film of the decade.

That film was *This Island Earth,* directed by Joseph Newman in 1954. A scientist receives, without explanation, plans for a strange machine. He builds it and finds that it is a two-way communicator with alien beings. Their planet, Metaluna, is being destroyed and they are enlisting help on Earth to prevent its destruction.

The climax of the film is the scientist's flight to Metaluna where he witnesses gigantic meteorites being brought from space by the Metalunans' enemies to crash into the planet's outer shell and so lead to mass destruction.

Scenes of our hero's flying saucer weaving through the meteorite bombardment just above the surface of the erupting planet are impressive by today's standards, let alone those of 30 years ago.

Space prevents more than mere mention of many other titles including *War Of The Worlds,* in which Los Angeles is destroyed by Martian fighting machines hanging, much of the time, from very visible wires, but which nevertheless was a very impressive film; *The Incredible Shrinking Man,* with its hero who shrinks smaller and smaller for no apparent reason and eventually disappears completely; it's almost as incredible spin-offs, *The Amazing Colossal Man* and *Attack Of The Fifty Foot Woman; Conquest Of Space, Earth Versus The Flying Saucers, When Worlds Collide, The Thing, The Fly, The Blob . . .*

The list goes on and on, but could never be complete without reference to just one more true classic of the genre. *The Day The Earth Stood Still* was one of the few to be based on an original SF story, *Farewell To The Master* by Harry Bates. It was impressively directed by Robert *(Star Trek – The Motion Picture)* Wise in 1951.

An alien, in the convincing shape of actor Michael Rennie, arrives in a flying saucer and, together with an enormous robot, lands in Washington. The alien, Klaatu, has a message for mankind. He wants us to give up fighting in case we endanger other civilisations 'Out There'. If we refuse, we will be destroyed.

His ideas, however, are not something the people of Earth, and especially the armies of 1950s SF films, are particularly keen on. During the course of the plot, Klaatu is injured and the robot, Gort, goes on the rampage. It transpires that, once started, he will not stop until he has destroyed the world. Only three words can stop him and they are known only to Klaatu who, anticipating trouble, has told them to Patricia Neal.

Luckily, she has a good memory and manages to save the world. We are then at liberty to hear Klaatu's message to mankind: *'Join us and live in peace, or pursue your present course and face obliteration. We will be waiting for your answer. The decision rests with you.'*

And with that, he's off into his saucer and out into space just in time for the closing credits.

P.S. Should you ever find yourself in a similar position, it might be as well to know the three words needed to stop the mass destruction of Earth. They are these: *'Klaatu Barrada Nickto.'* Remember them, you never know when they might come in handy . . .

Television: are you of a nervous disposition?

If one event more than any other brought TV into the houses and the hearts of the British public, it was the Coronation in June, 1953. From then on, radio found itself on the losing end of a battle for listeners who had discovered the magic of *seeing* as well as hearing their favourite programmes.

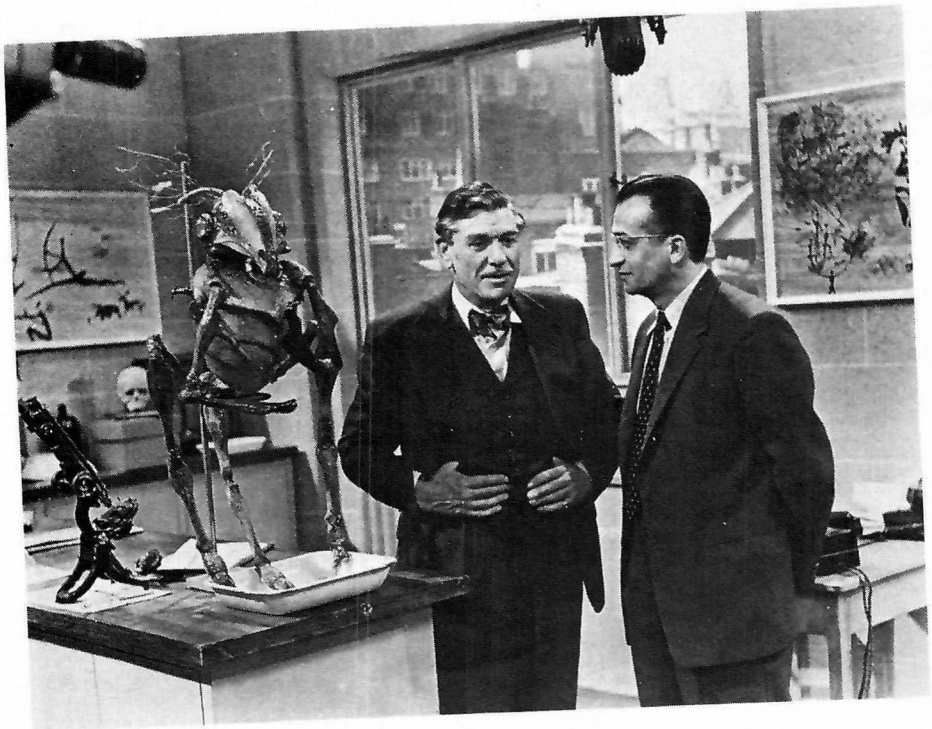
By today's standards, TV of that time was primitive: one channel only, productions all going out live, static studio sets and black and white pictures. But what it lacked in sophistication, it more than made up for in ambition.

In 1953, the BBC drama department consisted of just two men whose main task was to adapt books and stage plays for television. The time was right for something totally different. It came in the shape of one of the earliest specially written-for-TV serials: *The Quatermass Experiment.*

Quatermass was shocking. It was one of the first TV productions to be dubbed 'not suitable for children or persons of a nervous disposition.' Later, a film made from the series figured among Britain's first X certificates.

Back in the 1950s, the very word 'Quatermass' was guaranteed to send a chilling shiver down the spine. Parallels can be drawn with Frankenstein. Just as the good Baron is often confused with the monster he created, so the name Quatermass became synonymous with fear and evil. In fact, Professor Bernard Quatermass was a scientist whose only connection with evil was his battle against it.

And, like Frankenstein, the very name has an instantly memorable, sonorous ring to it. It



Professor Bernard Quatermass (André Morell, left) discusses his latest find with Dr Matthew Roney (Cec Linder). Looking over his shoulder – a prehistoric Martian. **Photo: © BBC**

was, without a doubt, a wonderful name. Who could dream up such a word? Where would anyone begin to find the inspiration to put syllables together and form a word like 'Quatermass'?

'I found it in the London phone book.' The words are those of Nigel Kneale who, as one half of that two-man drama department, conceived and wrote the three serials of the 1950s I spoke to him recently at his home in South London. The man who brought such a delicious sense of terror to a whole generation of early TV viewers turned out to be a very pleasant, softly-spoken Manxman who, when you tell him how he was responsible for scaring the life out of you as a kid, smiles warmly and thanks you for the compliment.

Before joining the BBC drama department, Nigel Kneale, the son of the owner-editor of an Isle of Man newspaper, had tried his hand at law, acting and writing. In 1950, he won the Somerset Maugham Award for a book of short stories. *'Unfortunately,'* he told me, *'awards don't always guarantee sales.'*

So he joined the BBC and worked, among other projects, on a puppet series.

The first episode of *The Quatermass Experiment* was broadcast live one Saturday night in July, 1953, and starred Reginald Tate. André Morell was the first choice for the part, but he turned it down because he felt it might damage his career.

'I had only written four of the six episodes and was in the middle of the fifth when we started,' Nigel remembers. *'No-one knew how it was to end.'*

Considering how difficult special effects were in those days, that was probably just as well. The plot revolved around a three-man space probe that returns to Earth with two of the crew missing . . . well almost. In fact, the 'person' who has returned is actually an amalgam of all three. What's more, he has picked up a nasty space disease in the form of a spore that takes over his whole body.

During the course of the first five episodes, the astronaut gradually begins to transmutate into some great horrific plant. By the sixth episode, the plant-monster has grown into a giant and has taken over Westminster Abbey during a live television broadcast. Imagine the consternation in the SFX department, such as it was, on first reading that final script!

'Until then, we had made do with sticking bits of plant and leaves on the actor's arm with glue,' Nigel recalls. *'By episode six, we were forced far beyond all that.*

'In later serials, we were able to pre-film tricky stuff like this, but on Experiment *everything was live.*

'Westminster Abbey seemed like a good idea for a location because the Coronation had been held there only weeks before and it was fresh in everyone's mind. Unfortunately it was crawling with tourists and we weren't allowed near the place. So the whole thing had to be faked in the studio.

'We brought in lorry-loads of branches and leaves and just tipped them into the studio. The place was full of people, hiding in the undergrowth and moving the stuff about in what they hoped was an ominous fashion.'

One high spot of the series was when the monster is first spotted in the Abbey, hanging over Poet's Corner, working its way down to ground level. Taxed on just how *that* was done, Nigel delved into a box in the corner of the room and pulled out, 30 years on, what was left of the monster: a pair of industrial gloves, a lot of wash leather and the remains of a few branches and twigs.

'We found a guide book on the Abbey with a picture of Poet's Corner in it,' he explained. *'We re-photographed it, blew it up and cut a hole in it. Then I put the gloves on, pushed them through the hole and, with one eye on the nearest monitor to see the effect, I just sort of waggled them about a bit.*

'I think that when you're a writer, you have a moral obligation to at least suggest how your special effects might be achieved. I went one better. I did the job myself.

'In all honesty, I never saw Quatermass *as SF, more as a send-up of SF. In fact, there was a scene in the middle of the first series, set in a cinema where they were showing a typical Fifties SF film called* Planet Of The Dragons. *I wrote that as a complete send-up, but it wasn't much worse than what was seriously being shown in cinemas at the time.'*

The success of *Quatermass* was a gradual thing. The BBC viewed it with a certain discomfiture, wondering at the trouble it might cause. The critics had little enthusiasm, some pointing out that it just wasn't realistic. But the public watched it in horrified fascination. In the end, they loved it and the critics stopped knocking it.

Some time later, the film rights were sold, but Nigel wasn't allowed to write the screenplay. An American writer and star were brought in to assure its success in the States.

In 1954, Nigel Kneale wrote the TV adaptation of George Orwell's *Nineteen Eighty-Four.* To say it caused a furore is to put it mildly. It was televised live one Sunday evening and was due for a repeat the following Thursday.

Long before the production was over, the BBC switchboard was jammed with complaints. In the intervening days before the promised repeat a chat programme was hurriedly put together to explain the Corporation's motives; actor Peter Cushing, who played the leading role, was inundated with rude phone calls at home; questions were asked in Parliament; and national newspapers denounced it with *This Play Must Not Go Out Again* headlines.

Then, on the Wednesday, *The Times* came out in support. Public opinion changed and the production was repeated. Today, it is remembered as one of the landmarks of British television.

Two more *Quatermass* serials followed in the 1950s, *Quatermass II* in 1955 and *Quatermass And The Pit* in 1958.

In *Quatermass II,* this time starring John Robinson, an extra-terrestrial colony is discovered in the South of England, being built by Earthmen who have been possessed by the aliens. The location was actually Shell Haven Oil Refinery. Of the three serials, this one is probably the least remembered, though it has its fans, especially in America where the Quatermass cult is still very strong. The film rights were sold on the strength of the first episode and this time Nigel Kneale insisted on writing the screenplay.

Probably the best remembered, and undoubtedly the most ambitious of the three, was *Quatermass And The Pit,* in which actor André Morell took his rightful place as the professor. The story concerned the discovery of a strange capsule, buried deep in the earth on a building site (actually a studio in Ealing). At first thought to be an unexploded German bomb, Professor Quatermass discovers it is actually a Martian spaceship that has been buried since prehistoric times.

Soon, strange forces begin to manifest themselves as the capsule comes to life. In a

story that mixes SF with the occult, proving that all the old legends about the Devil stem from the creatures in the ship and ending with a force of total evil taking over London, the author wove a totally convincing piece of hokum that riveted viewers to their armchairs for six solid weeks.

On the evening of the final episode, there couldn't have been many TV sets in the country that weren't tuned to BBC. The next morning everyone had seen it; everyone was talking about it; no one doubted that they had witnessed one of the all-time television classics. When was the last time you watched *anything* that could honestly be described like that?

A footnote: the point of no return

The 1950s were undoubtedly the golden years for SF. It's good to remember them but, like well-loved places visited in childhood, it's wise not to go back. Those who have tried have almost all failed.

The nearest anyone came to real success was in the late 1970s when Phil Kaufman directed a remake of *Invasion Of The Body Snatchers*. It was a pretty good film, but it had none of the claustrophobic paranoia of the original.

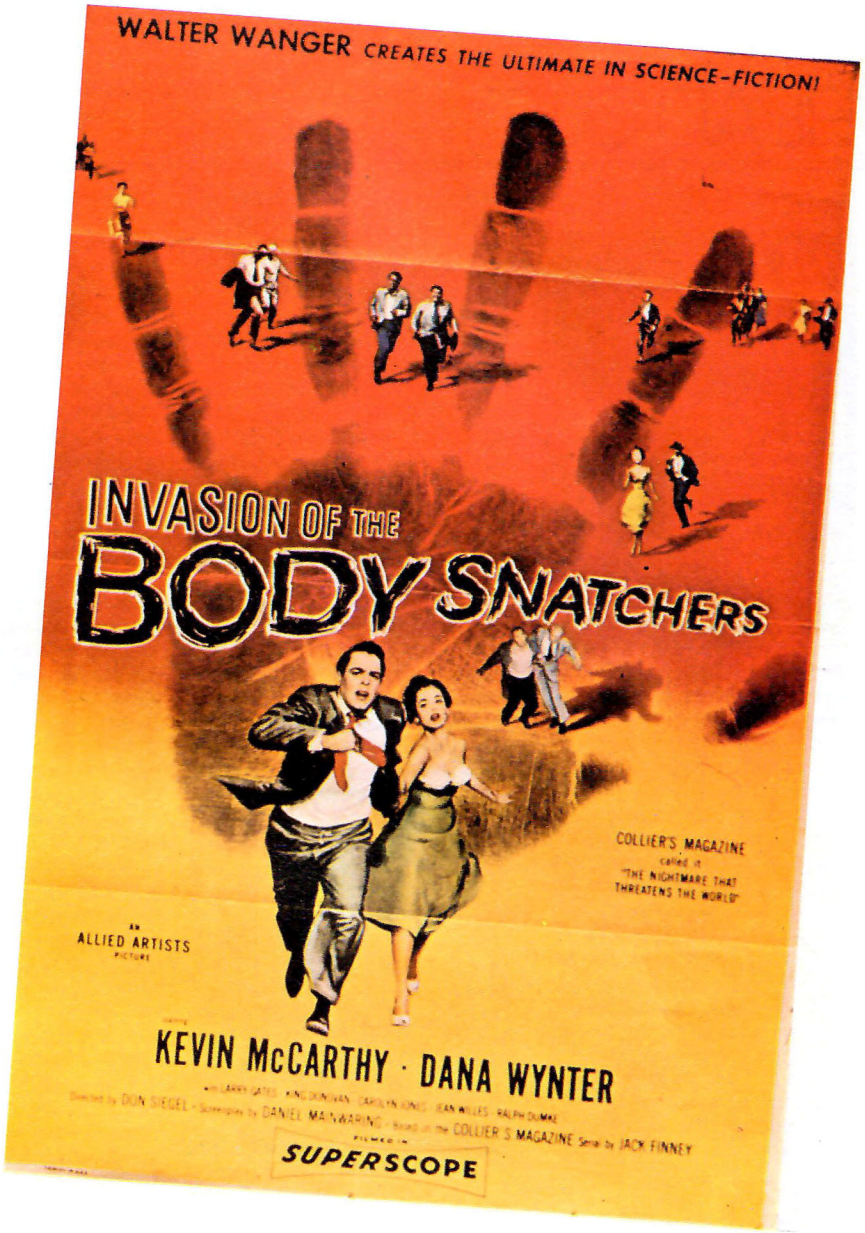
Back in 1966, the BBC remade Nigel Kneale's original script of *Nineteen Eighty-Four*. It was televised to a singular lack of reaction from the viewing public.

Towards the end of the 1970s, a fourth and last *Quatermass* series was shown by Thames Television. The script was by Nigel Kneale, the production costs were more than for the first three serials put together, the SFX were truly amazing. The public reacted with total apathy.

Only a few years ago, Charles Chilton wrote a fourth *Journey Into Space* episode, broadcast as a 90-minute play on Radio Four. Hardly anyone noticed.

Never go back.

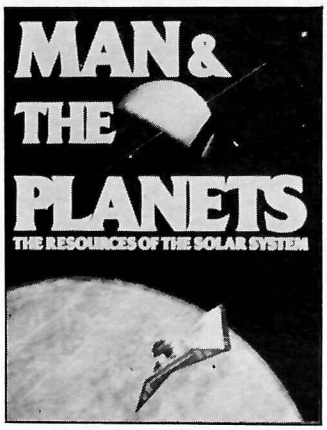
But never be afraid to close your eyes and cherish the memories . . . *(To be concluded)*


WALTER WANGER CREATES THE ULTIMATE IN SCIENCE-FICTION!
INVASION OF THE
BODY SNATCHERS
COLLIER'S MAGAZINE called it "THE NIGHTMARE THAT THREATENS THE WORLD"
AN ALLIED ARTISTS PICTURE
KEVIN McCARTHY · DANA WYNTER
SUPERSCOPE

Above, the year was 1955 and a film was released that was to go down in history as one of the very best SF films of all time. This is the poster for the original version of 'Invasion of the Body Snatchers.' Left, one of the better films of the 1950s was 'This Island Earth'. Here's the poster that advertised it in 1954. Photos: courtesy of National Film Archive.

READ OUT

SCIENCE FACT



'Man and the Planets' by Duncan Lunan. Published by Ashgrove Press at £9.50. Hard covers.

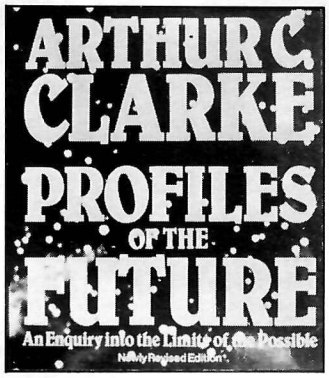
Duncan Lunan has been associated for many years with ASTRA, the Association in Scotland to Research into Astronautics, and much of this book comes out of papers presented to this society. It deals very basically with Man's relationship with his particular solar system, and the resources that are there to tap, once he can decide how to go about it. Some of the earlier chapters, dealing with the development of the shuttle, and how perhaps it could be done better, delve into technicalities and the references for chapter three in particular tend to swamp the main text!

Overall an interesting read, although I felt it did get a bit bogged down in places, but there is a selection of interesting names that crop up through the text – Tony Lawton (President of the BIS), Professor Archie Roy, Andy Nimmo and 'the other' Bob Shaw. Duncan does, I think, keep an overall perspective on the matter, and I particularly liked some of his asides, and also the opening to Chapter 4 (assigned to a past president of ASTRA, Sandy Glover), 'Oh, let's not get maudlin about Newton's Third Law'. **MI**

'The Amateur Astronomer' by Patrick Moore. Published by Lutterworth Press at £7.95. Hard covers.

When my husband Richard was a schoolboy and spent many of his evenings in the back garden with his telescope, this book was his invaluable aid. Now, unfortunately, the brighter lights of London have restricted our stargazing to rare visits to the country, or to a quiet lane on the way back from a convention, but Patrick Moore's book, now in its ninth revised edition, is still a valid textbook for the enthusiastic amateur who wishes to study the subject seriously. Do you want to make a telescope? This book gives full instructions, including grinding lenses. It also advises on types of telescopes or binoculars to buy, gives a short history of the study of astronomy, and a guided tour of what is visible in the night sky in the Northern Hemisphere. There's also a small guide for those on the other side of the world, and some excellent black and white photographs. But this is a textbook for amateurs so don't buy it for your small brother, unless he intends to be a second Patrick Moore! Incidentally, for the permanently broke, any good library should stock this, so go boldly in and ask for it.

MV



'Profiles of the Future' by Arthur C Clarke. Published by Victor Gollancz, Ltd., at £8.95. Hard covers.

The amazing thing about this book is that it was originally written over 20 years ago – 1962 to be precise – and apart from the odd footnote that Arthur has added for this new edition, is still as relevant as it was then.

Always the visionary, Arthur Clarke views the future with optimistic caution although, as he states at the very beginning of the book's introduction, his aim is not to 'predict' the future (something invariably doomed to failure) but rather to define the boundaries in a scientific and technological sense.

Some chapters deal with subjects close to home, 'The Future of Transport' and 'Riding on Air'. For the former, Arthur splits journeys into four types: very short, short, medium and long. For the first of these, the horse could very well come out on top, with the bicycle and, perish the thought, walking, close seconds. 'Riding on Air' involves the vehicle which, when this book was originally published, was so new that Arthur had to take up several pages explaining how the beast worked. It is, of course, the Hovercraft, although in a world-wide sense it is more often referred to as a GEM (Ground Effect Machine). Personally, I feel 'Hovercraft' is much more descriptive.

Perhaps less immediately understandable to the general reader are the concepts about such mysteries as Space, Time and Gravity, perennial favourites with 'futurologists'. Here, though, Arthur succinctly explains just why some ideas will not work (that is as long as you except the Laws of Physics as they stand) but gives some intriguing alternatives. Travel into the future, as such, is deemed implausible (note the term impossible *isn't* used!) but we already know of two methods by which a similar result can be obtained. One is hibernation, in an extended form, and the other, a spin-off of the Special Theory of Relativity, which gives the time-dilation effect. Neither are particularly practical, both are a one-way journey, but both do demonstrate alternative ways around problems. And the book is full of such examples. If you like a factual book that reads in an almost fictional style, in that it's difficult to put down once you start, you'll find *Profiles of the Future* very revealing. I'm now wondering just how much of it, if any, Arthur will have to revise in an edition for the year 2002? **MI**

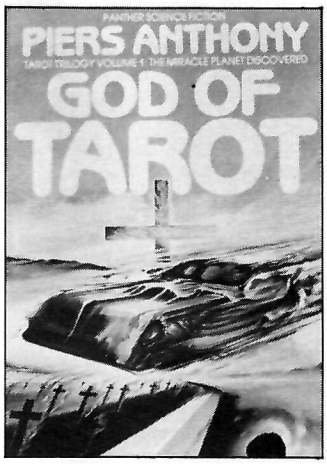
SCIENCE FICTION

'The Dancers at the End of Time' by Michael Moorcock. Published by Granada at £2.50. Soft covers.

This is my fifth attempt to review the *End of Time* trilogy, presented here complete in an omnibus volume. All my previous drafts got bogged down within a paragraph. Moorcock is a writer who defies criticism; at least in the easy, conventional labels of a capsule review. Every assertion about his style, form, or thematic development, melts away under closer examination. His creations are delicate ones, shaded in pastels.

The main thread of the narrative follows the courting of Mrs Amelia Underwood, a Victorian housewife, by Jherek Carnelian, an innocent immortal from the end of time. As they tumble through the centuries together, aided by the likes of Frank Harris, H G Wells, Oswald Bastable, and Una Persson, Inspector Springer arrests some alien invaders, and Lord Jagged of Canaria saves the universe with the aid of a robot nanny.

In short, then, this is Moorcock pretty close to his best. Tragedy, whimsey, and farce, whipped into a delightful confection by a master chef. Delicious. **AS**



'God of Tarot', 'Vision of Tarot' and 'Faith of Tarot' by Piers Anthony. Published by Granada at £1.50 each. Soft covers.

The story begins on Earth in the near future. Natural resources have been almost exhausted by an ever-increasing population, and energy drained by 'Matter Transmission' – a form of instant travel to habitable wilderness-type planets. The remainder of Earth's population, who are still waiting to leave, must live in somewhat primitive manner.

Brother Paul is a novice of the 'Holy Order of Vision', a modern-thinking religious sect working for the improvement of mankind. His Superior tells him of the planet Tarot, where both old and new religions flourish, but everybody worships one god – 'The Tree of Life'. The residents of Tarot are being haunted by apparitions conjured up by the mystery-filled deck of Tarot cards. They are being confronted by animations so real that some are driven mad while others lose their lives.

Brother Paul's mission is to visit Tarot to determine whether the Deity manifesting there is, or is not, God. On his arrival, he discovers that although there are many different religious sects at loggerheads, the rigours of life on Tarot require that they co-operate with one another – or die.

Brother Paul begins to experiment with animations, some of them pleasant and some frightening. He starts to discover and comprehend things about himself

in his own future. But still the question remains unanswered – is this God? He does not feel that he will be qualified to reach his decision until he has taken, and survived, the ultimate test – a visit to his own personal hell. Suffice to say that his experiences in Hell are not pleasant, and many people may find this portion of the story objectionable, but it is nevertheless necessary to conclude the scenario.

Only the first book of this quarter-million-word trilogy can be read on its own, the other two would be pretty meaningless without any prior knowledge of the novel. It is very complex in nature, yet still gripping. The message, however, is loud and clear: you cannot know the true meaning of happiness until you have experienced the depths of despair . . . **NJ**

'The Star Trek Compendium' by Allan Asherman. Published by Star at £4.95. Soft covers.

Billed as the most thoroughly researched and complete *Star Trek* reference work ever published, and licenced by **Paramount Pictures,** this large format book, originally published by **Simon and Schuster,** covers the first two pilots, the episodes and production credits for the entire TV series, as in the previous compendium, and now includes the first two films. It doesn't include the short series of animations, but you can't have everything. It also includes short histories and stage and screen credits of the main actors up to the early 1970s.

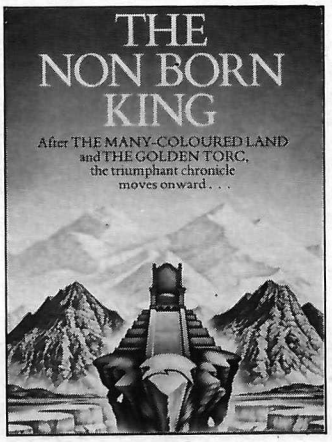
Allan Asherman is a SF fan who got hooked on *Star Trek* after seeing the second pilot 'Where No Man Has Gone Before' at the 1966 World Convention in Cleveland, Ohio. (For the benefit of non-*Trek* fans, the first pilot, 'The Cage', later incorporated in a two-parter entitled 'Menagerie', was rejected by **NBC** because, 'It was too cerebral'.)

He gives a precis of each episode, in many cases commenting on the earlier scripts and later adaptations, also on special effects, sets, costumes, etc. For instance, the exterior Deneva locations in 'Operation Annihilate' were photographed at the California HQ of the TRW Corporation, the sets for 'A Piece of the Action' were those used for 'The Untouchables', and the ore freighter destroyed by the M-5 Computer in 'The Ultimate Computer' was stock footage of the Sleeper Ship in 'Space Seed'. As Michael G Lancaster mentioned in *June's* VOYAGER, the music composer for each episode is credited, together with the writers and designers. There are also many black and white stills scattered around the pages, but no index.

Allan Asherman has learnt the difference between facts and opinions, and clearly states which is which. I don't always agree with his opinions, and there are a few minor errors in his facts, judging by the versions that we have seen, but this book is a must for fans not just of *Star Trek,* but of any media series, as it gives lively glimpses of the efforts that went on behind the scenes, as well as in front of the cameras, to make a competent series.

How many people realise the lack of time in such series? For instance, the first draft of 'A Private Little War' was dated August 30, 1967, and the episode was filmed in late September and early October of the same year, with other episodes being produced simultaneously. Media SF, unlike the written side, is produced very much in a rush, for the day itself, with no idea of producing masterpieces for posterity and thus following in the footsteps of such great men as Shakespeare. Maybe, four centuries from now, English students will be examined on *Star Trek, Star Wars, Dr Who* and *Quatermass,* and many books will be written on the deep meaning behind the characters and plots. By then, no doubt, the Compendium will have been supressed for treating a classic far too lightly, so get it while you may.

MV



'The Non Born King' by Julian May. Published by Pan Books at £1.95. Soft covers.

'Read out' (*New VOYAGER* No. 1, Autumn, 1982), reviewed the first two books of this 'Saga of the Exiles,' namely *The Many Coloured Land* and *The Golden Torque.* Like me, Marion van der Voort found them slow to start but compulsive and fascinating reading. Anyone coming to Book three without the previous experience of Books one and two is, I feel, at a disadvantage in spite of the excellent and very necessary 28 page synopsis of the galactic milieu and the Pliocene exile. The slow start of *The Many Coloured Land* was due to the meticulously detailed character and scene-setting by the author to establish the credibility of her characters, before her assembly of misfits and mavericks of the 22nd century passed through the time doors to the Pliocene epoch of earth.

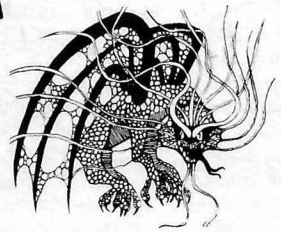
After reading the first book of the saga I was left impatiently searching the bookstalls for *The Golden Torque* since Julian May, having created her eight main human characters, proceeded to split them into two casts cleverly leaving the reader to wait for Book two to learn the fate of those in the second group whom she had sent off in a different direction. Book two further told the plight of the humans enmeshed in the age-old war of two dimorphic alien races – the 'Tanu' and the 'Firvulag'. Again, a book one couldn't put down but with not quite the same cliff-hanger ending; and so on to Book three, *The Non Born King.*

After the 'Grand Combat', the dominion of the 'Tanu' has been broken and in the aftermath of cataclysm, one human exile, whose metapsychic and special talents have grown in strength as the saga progresses, Aiken Drum, seizes his hour to gain control. Not as gripping as the first books, but still compulsive reading and hard to put down once started.

It does tie up several loose ends. The European exiles meet up with the North American rebels, survivors of the 2083 metapsychic attempted coup. Most of the book deals with the resultant power struggles and now one waits for Book four, *The Adversary,* to produce the ultimate recurvature back to the galactic milieu, with Earth around the year 2110, when it all began.

The melange of science, geology, genetic engineering, fantasy, the metapsychic and human destiny is a powerful one. The implications of the tales of spacemen and alien beings in man's

Continued on page 67



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STAR WARS

RETURN OF THE JEDI

SFX SECRETS REVEALED

ADAM EISENBERG INTERVIEWS SOME OF THE LEADING TECHNICIANS RESPONSIBLE FOR THE AMAZING SPECIAL EFFECTS OF THE THIRD 'STAR WARS' FILM IN THIS, THE FIRST OF AN EXCLUSIVE TWO-PART FEATURE.

The editors and publishers of *Space VOYAGER* are pleased to present this rather special article for all fans of the *Star Wars* Saga. We would especially like to thank Maureen Garrett and Sue Blackmore of *Lucasfilm* for providing the illustrations which accompany these features.

All photos: © Copyright, 1982, Lucasfilm (LFL), Ltd.

Richard Edlund

Co-supervisor of visual effects for *Return of the Jedi*, Richard Edlund, has been a cameraman for 20 years. Before encountering The Force for the first time on *Star Wars*, he worked on primitive effects for TV's *The Twilight Zone, The Outer Limits* and *Star Trek;* produced promotional films for several leading rock groups during the late 1960s, and helped create some of the early 1970s' most dazzling TV commercials including the light-filled extravaganzas for **7-Up.**

In 1975, Edlund was hired to serve as first effects cameraman on *Star Wars* under supervisor John Dykstra. Following this first Luke Skywalker adventure, he worked on *Battlestar Galactica* and *The China Syndrome,* and then served as effects co-supervisor on *The Empire Strikes Back.*

Edlund, a Zen buddist who claims he's not a fan of science fiction or fantasy, has also supervised the effects for *Raiders of the Lost Ark* and *Poltergeist.* He was won two Academy Awards and been nominated three times, most recently for *Poltergeist.*

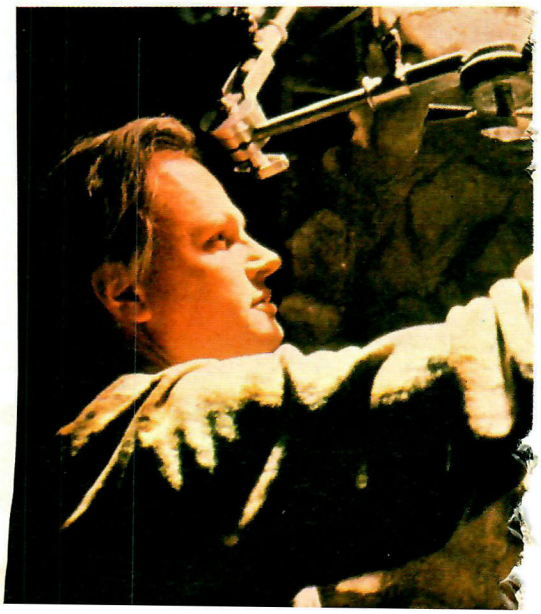
SPACE VOYAGER: On *Jedi* you were chiefly responsible for the flying skiffs and the sand barge on Tatooine, and the Death Star tunnel sequences. Which was the most difficult to execute?

RICHARD EDLUND: Both were extremely challenging. The Death Star effects involved a chase down very narrow channels, and we faced a constant struggle to keep the scale, pace and pitch consistent in over 70 different shots.

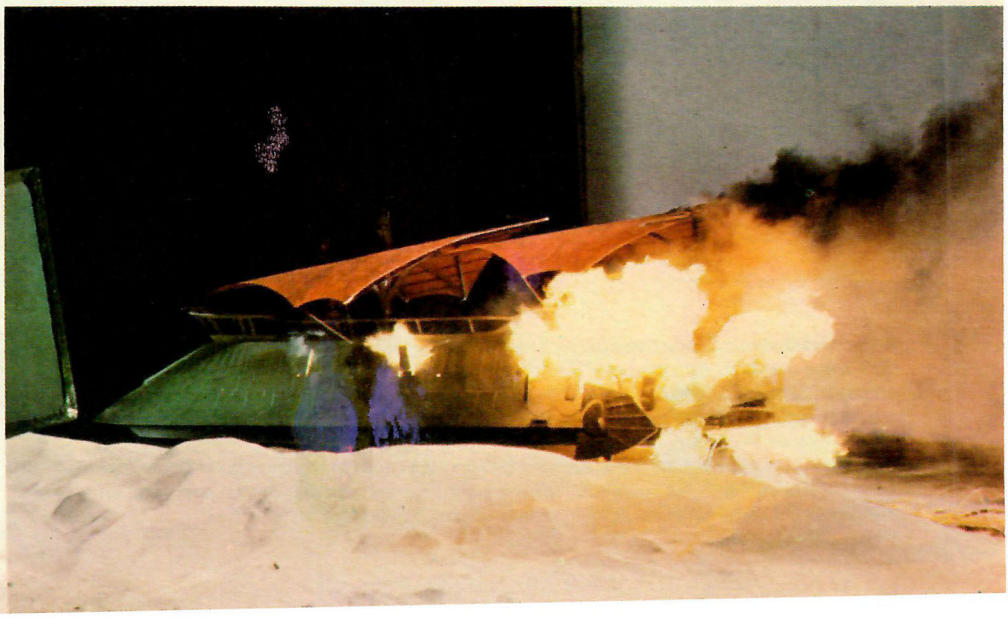
The effects for Tatooine, on the other hand, were also hard because desert sequences are *always* difficult. As a rule, they're set in brightly lit sunshine in a location people have either visited or seen in *National Geographic.* Because the setting is so familiar to most of the audience, any slight flaw will be picked up by your average ten-year-old viewer. We could proceed to explain all the problems we faced trying to execute the shots, but it wouldn't matter because all he or she's doing is going to the movies. If we let the audience down, we've failed to do our job.

V: Explain some of the techniques you used to travel inside the Death Star.

RE: We had more than a football field in length of model tunnels constructed and we filmed them using our motion control cameras. We moved down them in one direction, pulling off pieces as we went along. Three different types of tunnels had to be built to facilitate the



Above opposite, in the pit under Jabba's throne, Luke Skywalker is forced to defend himself against the deadly Rancor by wedging a bone from a former victim in its mouth. Right, visual effects supervisor, Dennis Muren, adjusts the lighting on the miniature Rancor set. Photos: Terry Chostner. ***Far right, a five foot long miniature of Jabba's Sail Barge explodes during a test for timing and camera speed.*** Photo: Kerry Nordquist.



action, and each had to be lit and filmed differently. Executing the sequence took us a long time because we wanted to have the ships darting around the interior structure of the tunnels and have much more movement than we had in the trench sequence in *Star Wars.* We photographed at one frame per second and we had to go one step at a time, so it was a very slow process.

V: For the sequences on Tatooine, you actually went out on location with the production crew to Yuma, Arizona where a full-scale barge was built. Why?

RE: I went to shoot some of the background plates we later used as matts for the flying skiffs and the barge. The production was filming in an area called Buttercup Valley where the original *Beau Geste* (1939) was photographed. Back in those days, the producers set up a huge camp with tents for the thousands of extras. George Lucas often reflected on this while we were filming, saying, *'That* was movie making!'

One of the problems we faced involved trying to avoid the thousands of dune buggies and jeeps that constantly travel over the dunes. We closed off the section we were working in and had a team of guards on buggies and all-terrain-cycles to watch the outer edges and ensure we weren't disturbed. Unfortunately, they would go out and suddenly appear on top of some distant dune right in the background of where we were filming, ruining the shot.

I had to shoot plates of an untouched desert. The only way I could do that was to wait until after a storm had blown through and then get up early in the morning and film before any dune buggies got out and covered the sand with tyre tracks.

V: Shots of Luke's landspeeder in *Star Wars* were very short in length and not always completely believable. Did you face similar problems levitating the sand skiffs and the barge?

RE: There's an old adage in the effects business: if any shot plays too long on the screen, whether it involves a floating cup of coffee or an exploding spaceship, the audience will pick up on how it was done. When we film effects, we have to consider both time and the quality of the shot to judge how long we can show it. In the original *Star Wars,* we had to settle on having just one or two shots of the hovercraft to suggest the idea of it. Since then, we've learned a lot and have a much better matting system so that, now, we can have skiffs flying around for ten minutes and not be afraid of giving ourselves away.

V: What is it like to work at ILM?

RE: It is a very free, creative atmosphere with a lot of interchange of ideas. A great deal of the communication actually occurs around the coffee machine. We all go out to get our energy refill and bump into someone from another department and start talking.

Every morning, all the departments come together to watch the dailies – the footage produced during the previous day. It's sort of a tea house situation. We all hang our swords and departmental rivalries outside and enter as equals. If a person in one department has an idea to offer to another, they do so. 'Dailies' help us know what the other departments are doing and gives our projects a greater sense of consistency.

V: When you first read the script for *Jedi* it was not complete because key dialogue pages had been replaced to hide the plot's surprises. Did that hinder your ability to execute the effects?

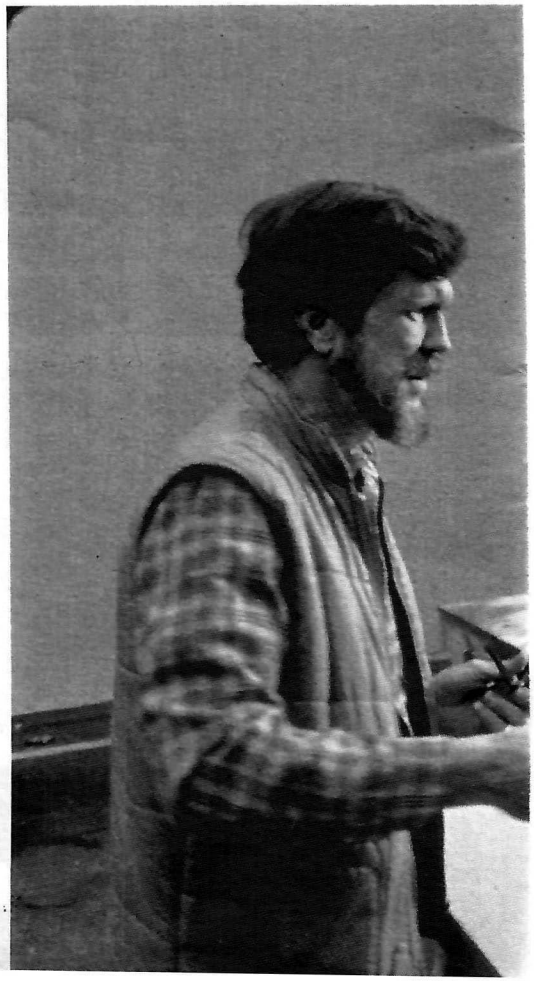
RE: I read the script knowing there were phoney pages in it, but it basically read and I could always understand the action. At this point, after doing the earlier *Star Wars* films, we know what George wants and we're able to go along much easier than we are on other films like *Poltergeist.* For that project, we had to develop the effects as the picture itself evolved because the script was always being revised. For *Jedi,* while we didn't know all the plot details, we did know the *Star Wars* universe so it was not as difficult.

V: Every year new films come out hoping to dazzle audiences with better and more fantastic effects. Do you worry that what you create for the screen today may appear dated next year?

RE: No motion picture can ever be perfect and effects films in particular have their share of questionable-looking shots. Even the best effects may convince audiences today but appear dated tomorrow. But, if the film is a classic, I think that quality adds to its charm. Watching a *Buck Rogers* serial today, it's obvious that the backgrounds were painted on drums and that the spaceships are 'hokey'. But we have to realize that while it may seem phoney to us, to the people for which it was made, it represented exotic, futuristic worlds. Ten years from now, new audiences may look back on *Return of the Jedi* and think it looks dated, but like the original *King Kong* or *War of the Worlds,* it will still be a classic. Those same viewers will get caught up in the story and accept whatever flaws there are as part of the period in which the film was made.

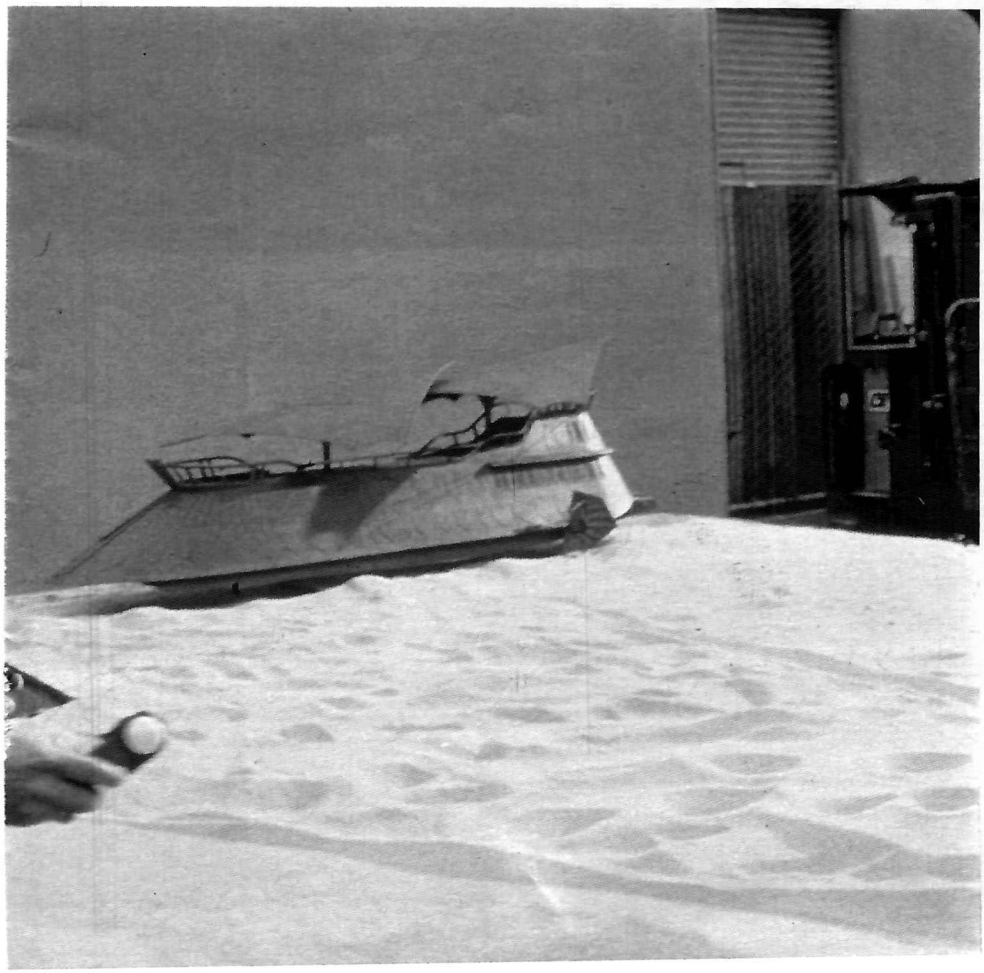
V: After *Star Wars* debuted back in 1977, George Lucas was asked how he'd rate its effects on a scale of 1 to 10. He said he give them a 3.5. After *Empire* was released, you were asked to apply the same question to the sequel, and you said it was an improved 6.5. How would you rate *Return of the Jedi?*

RE: I think the effects in *Jedi* are better than those in the first two films, but I'm not going to



Top, the enormous Stage 6 at Elstree Studios measures 250 feet by 120 feet and is 45 feet high. This stage was built especially for 'The Empire Strikes Back' and is one of the largest sound stages in Europe with nearly 1.5 million cubic feet capacity. For 'Jedi', the stage was used to create the Imperial Death Star docking bay and the massive gate of Jabba the Hutt's desert Palace. **Photo: Elstree Studios.**

At right, visual effects supervisor Richard Edlund takes light readings around the miniature Sand Barge and desert set. The scenes on Tatooine are the most exciting of the entire film, and took many months of painstaking work to create. **Photo: Robert McGrath.**



say they represent the perfect '10' because then I might as well retire next year. As we continue to work on new projects, we learn more and keep re-defining the point system. The ladder expands above us just when we think we're about to reach the top. I'd say we've gone a number of rungs since *Empire* and certainly many since *Star Wars.* At this point in ILM's history, we've done the best job we could.

Dennis Muren

Co-supervisor of visual effects for *Return of the Jedi,* Dennis Muren, first began creating cinematic tricks when he was in grade school. While attending college in Los Angeles, he directed his first feature, *Equinox,* a 16mm project designed to highlight his work and the stop-motion abilities of Dave Allen. In the early 1970s, he worked with Charles Cahill on two educational films about the universe; *Flesh Gordon; Willy Wonka and the Chocolate Factory,* and many television commercials at **Cascade Pictures.**

On *Star Wars,* Muren served as second effects cameraman. He followed this by working as an effects cameraman on *Close Encounters of the Third Kind.* When ILM moved to northern California to create the visuals for *The Empire Strikes Back,* Muren went along and has been with the company ever since. *Raiders of the Lost Ark* and *E.T. – The Extra Terrestrial* are also among his credits. *E.T.,* for which he served as visual effects supervisor, earned him his third Oscar.

On *Return of the Jedi,* Muren specifically supervised the Rancor and rocket bike sequences. In addition, he supervised the effects involving the land battles on the moon of Endor.

V: For the Rancor fight with Luke Skywalker, why did the full body suit not work out?

DENNIS MUREN: We originally planned to make the most elaborate suit ever because the creature is essentially man-shaped, but it just never looked right. At one point, we had three people operating the thing, and if the background was dark enough and we filmed at a high speed, we got something that sort of worked. But there were still many problems associated with trying to create a correct sense of mass and weight for a monster that's supposed to be about 18 feet tall. We also found it difficult to make the movements seem natural, so we ended up using the miniature puppet.

V: Please explain the basis for Telematics, a unique new tool used in the planning stages of *Return of the Jedi.*

DM. Telematics came about because George had discovered that animatics, or animated storyboard sketches, had been very beneficial during the making of *Empire.* When he began editing the film, he had found the animatics particularly useful to fill in the gaps so he had something to edit into the picture while the effects work was still being finished. When it came time to do *Return of the Jedi,* we had several effects sequences for which we'd have nothing until they were completely done. The rocket bike sequence was one of them. He wanted to see how the motion and action of the battle would flow.

The cartoon system involved in animating

the storyboards took so long that we thought there must be another way. We had used it on *Dragonslayer* as well as *Empire* and found it not only time consuming, but also it allowed for only limited action. Our first alternative was to use computer-generated images to rough out the sequences but by the time our computer division could get anything going, they were heavily involved in creating the Genesis effect for *Star Trek II* and they couldn't spare the time. The quickest thing for us to do then was to shoot the sequences using a video camera, toys and makeshift backgrounds.

The first telematics we did was on the bike chase and they worked out so well we built a whole video department to use them for the rest of the effects. For the chase, we used little model bikes about a foot long with action figures sitting on top. Then, we built a miniature forest set using some of the trees from our *E.T.* models, and cardboard tubes painted brown. We placed this on a table top covered with carpet.

We also used Telematics for the Rancor sequence. Before any of the actual footage had been done in England with the real actors, we dressed a man in a gorilla suit to act as the monster, and we matted into the shot one of our guys at ILM who looks like Luke. The background cave was made out of wrapping paper.

V: What are some of the advantages and disadvantages of telematics?

DM: If the director walks onto his set with just the script in mind, he's only dealt with words. Storyboard drawings were developed to give him a better sense of the action, but these, too, are limited. But, if he has actually seen the sequence and realized some of the problems involved in making it work, then he's much better off. Telematics provide this opportunity. Someday they may replace storyboards entirely. For an editor like George, they are also extremely helpful because they enable him to see how the action flows, how the movement works with the pacing and tempo.

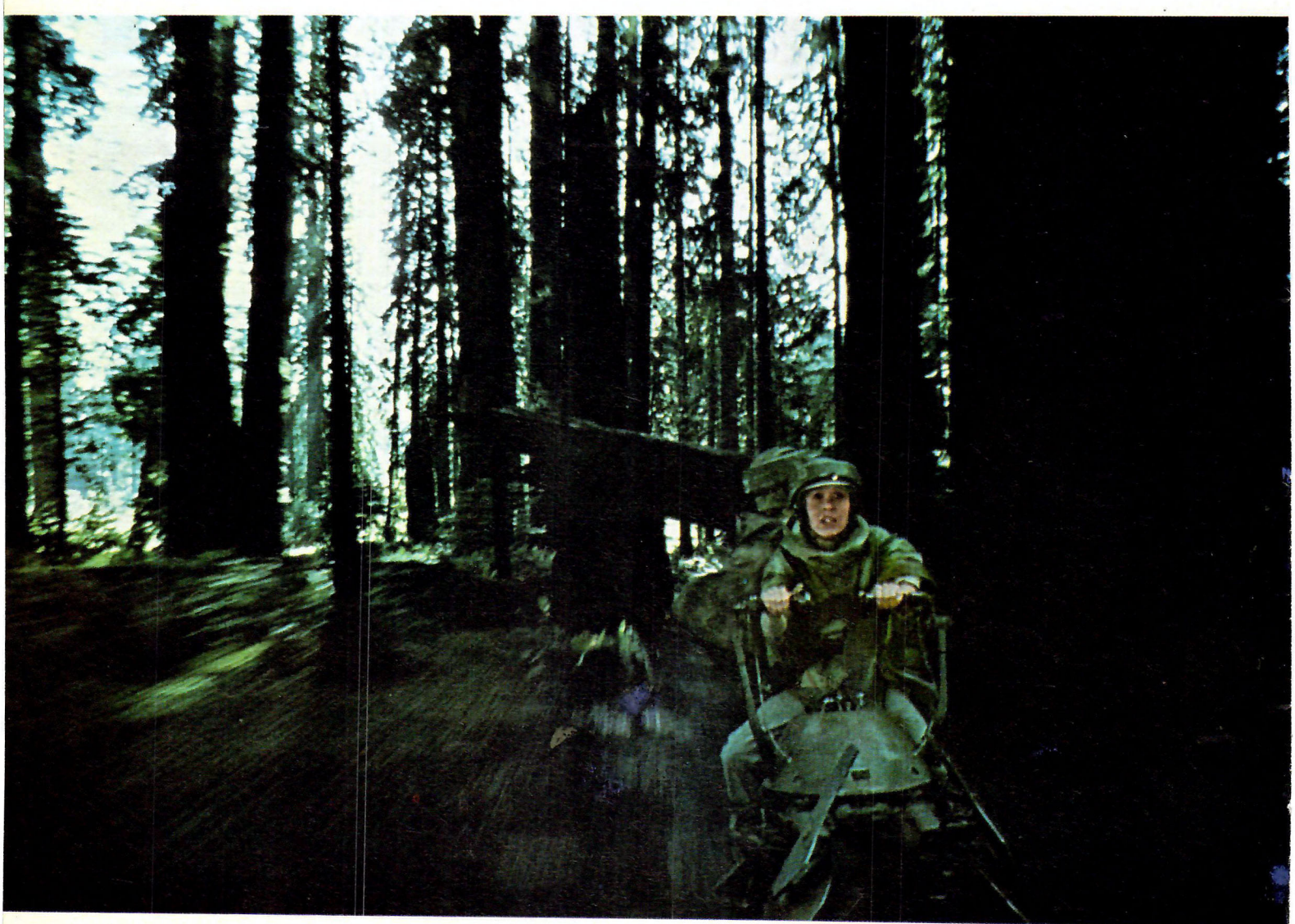
At the same time, however, they are not as beneficial as they might sound because there is an incredible difference between how the toys look and the finished effects. They can't provide all the answers, and the film will always need to be adjusted when the real footage is completed. Still, overall, they are more helpful than not.

V: How was the rocket bike chase done?

DM: Overall, it was a very difficult sequence running about 3½ minutes with the bikes travelling at about 120 mph through the forest. For the isolated close-ups and medium shots of the actors, we put them on full-scale bikes positioned in front of a bluescreen, with flickering lights flashing on them to simulate the sunlight breaking through the trees. To help us see what this lighting was like, we had a cameraman shoot some footage of himself riding a motorcycle through the woods. It wasn't as interesting as we had thought, so we jazzed it up a bit.

Filming the actors was fairly straightforward. They were sitting on bikes which were hooked to cranes so the bikes could be raised or lowered about 12 feet, and moved back and forth. The camera was also on a crane and could move in and out about 40 feet. This helped create the sense of the bikes moving

Below, a single frame from a completed two-element optically-generated composite of the exciting Speeder Bike chase sequence on Endor.



through the air.

The most difficult aspect of the sequence was then trying to figure out how to get background footage to matt behind the actors as they zip through the forest. I took a day off and went out to Eureka, California where we planned to shoot some of the background plates with the idea that we would build a large forest set on our soundstage. As I was driving up to the location, I realized that we could shoot side views of the forest from a car. The only shots which would then be difficult were those looking directly in front and directly behind the bikes.

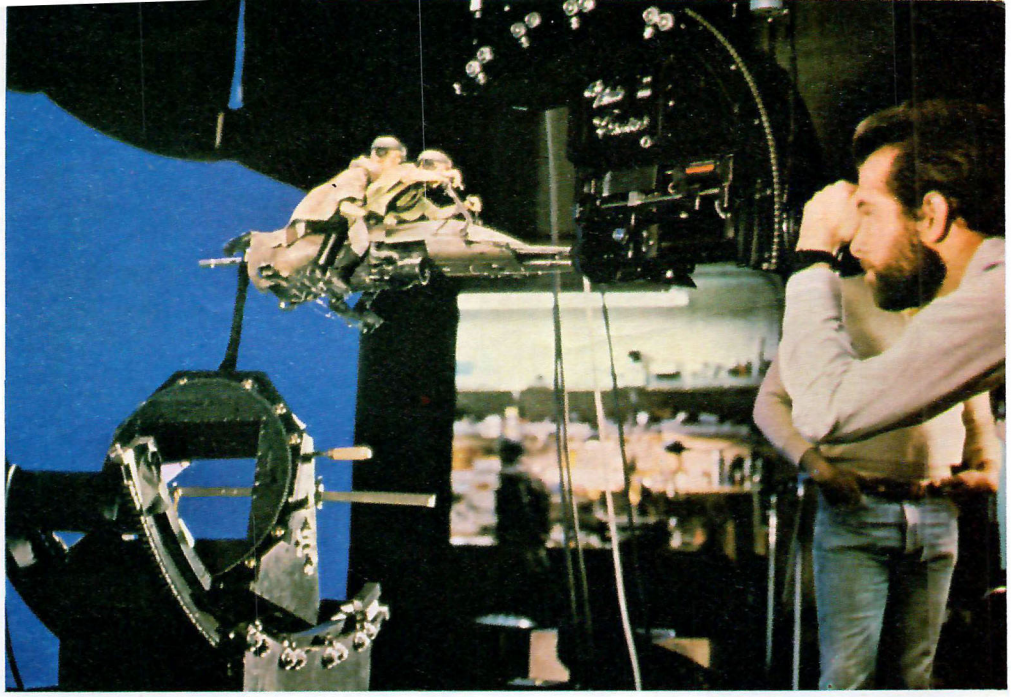
At this point, we talked about building a hugely expensive set with sculpted trees and a camera mounted from above on a boom which could then hang down in the middle of the set. To enable it to zip around, we planned to have trees swing out of the camera's way. We also thought about hanging the camera on a cable and running it through the actual forest, but then it wouldn't be able to move around the trees.

What we finally ended up doing was hiring Garrett Brown to use his 'Steadicam' system. The Steadicam is a camera hooked onto a body harness which is specially designed to keep the camera free from shakes and jiggles. We steadied it further by adding gyros. In addition, we mounted a video camera and viewer on the side of the Steadicam. Garrett walked along the real forest following a camouflaged path along the ground. We also had a camouflaged string at about the lens height to keep him vertically stable. The video camera was set on telephoto and focused on a distant object. Any variation away from the path would show up on the monitor, and this proved very helpful in keeping Garrett moving in the correct direction. When it came to the banking curves, Garrett had to wing it and pan slowly on his own.

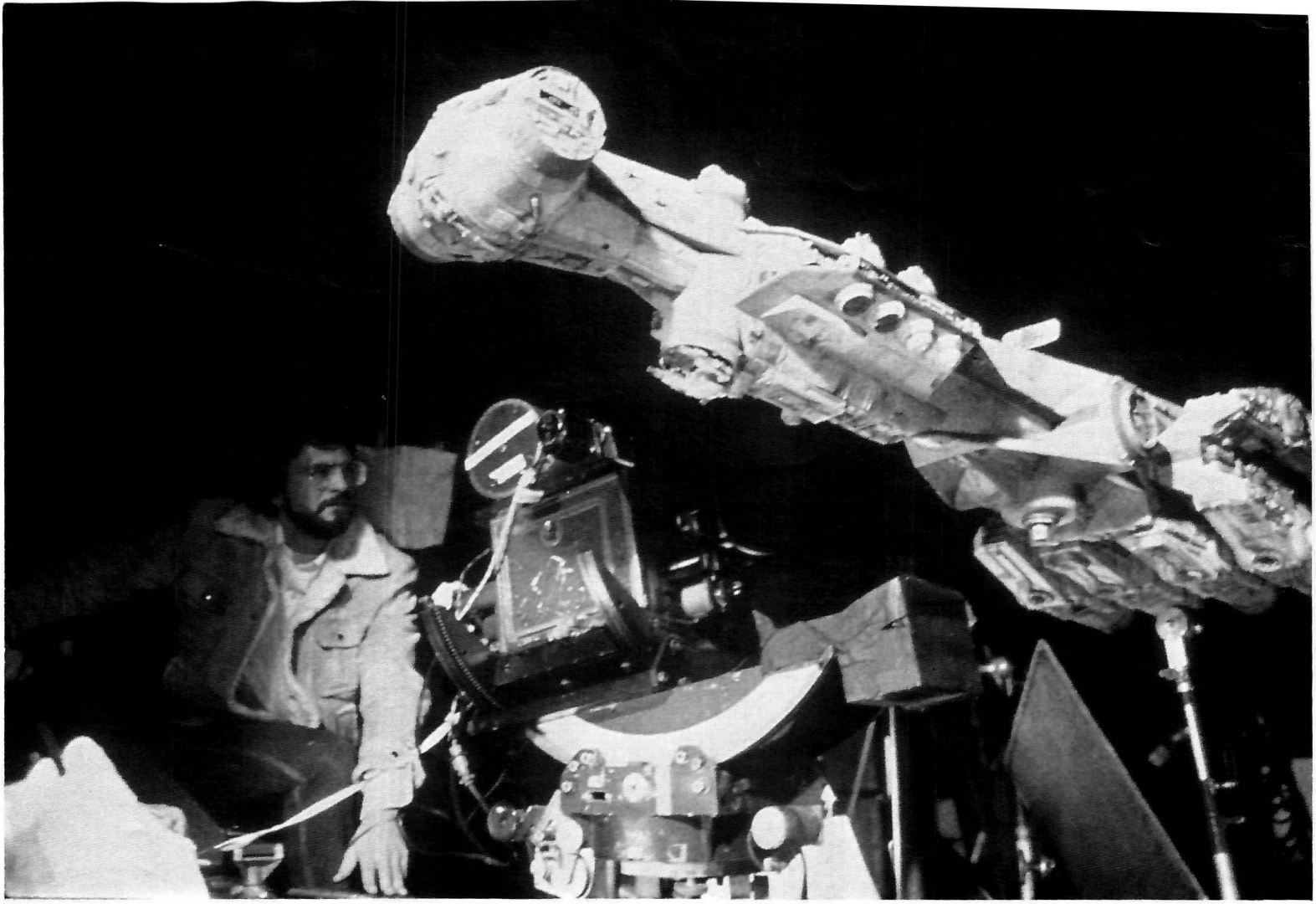
To create the sense of travelling through the forest at a very fast speed, we shot the footage at one frame every 1.3 seconds. In-between each frame, Garrett walked about seven feet so when this footage was later run at the normal 24 frames per second, it looked like we were travelling at about 168 feet per second!

We filmed the footage during two periods, the first four days and the second two more. As I mentioned earlier, the side views were filmed from cars and we also used camera dollies for certain shots where we're just watching the bikes zip through the forest.

Overall, the bike chase was very challenging because we've never had to do anything like it before. The *Snowspeeders* in *Empire* were somewhat similar but they were still space-ships. The bikes had to hug the ground within five to ten feet, and they were moving so fast



Above right, effects cameraman Mike McAllister lines up the Vista Cruiser camera for a shot of the miniature Speeder Bike and puppets. The bike is attached to a specialised pylon which can be programmed to roll and tilt to simulate flight. Photo: Roberto McGrath. ***Right, visual effects supervisor, Richard Edlund, stands next to the four foot Falcon model mounted on the model mover.*** Photo: Terry Chostner.



Special Effects Supervisor, Ken Ralston, prepares to shoot the Rebel's Blockade Runner for the space battle sequences. The model was originally used in 'Star Wars' and refurbished for its new role in 'Jedi'. Photo Robert McGrath.

we always had to keep in mind how they related to the backgrounds. The sequence involved over 100 shots in all.

V: What do you like most about creating visual illusions?

DM: I enjoy trying to figure out the best way to create the effect we want. I'm always onto the next project by the time the last film opens, so I can never sit back and enjoy it. I'm too concerned with how I'm going to solve the new challenges . . .

Ken Ralston

Return of the Jedi's third co-supervisor of visual effects, Ken Ralston has been involved with film production since he was 17. He began by working on commercials at **Cascade Pictures** where he met Dennis Muren. As a result, when *Star Wars* was gearing up, Muren brought Ralston over to ILM where he served as assistant effects cameraman.

After the first Luke Skywalker adventure was completed, Ralston worked for a time on Dave Allen's aborted *Primevals* project and Jim Danforth's *Timegate,* which was also never completed.

Ralston re-joined ILM for *The Empire Strikes Back,* and has been with the effects facility ever since. Beside the three *Star Wars* films, he has also worked on *Raiders of the Lost Ark* and *Dragonslayer* and served as visual effects co-supervisor on *Star Trek II – The Wrath of Khan.*

On *Return of the Jedi,* Ralston was the supervisor of the opening sequence in space near the planet Endor, the 'Into Hyperspace' jump of the entire rebel fleet, and the space battles before the film's climax inside the Death Star.

V: What was the most difficult sequence to complete?

KEN RALSTON: The space battles, because they involved so many different elements in each shot. Every frame in the sequence is rich with detail featuring ships, laser beams, planets and explosions, all of which had to be choreographed together yet filmed separately, one at a time. We also tried to give the camera added movement. In the battle sequence, we tried to keep it moving constantly to create momentum and add to the feeling of chaos. I think we've really produced one huge fight that will prove to be an even bigger payoff than the audience expects.

V: One of the shots in the space battle was the most complex ILM had ever produced.

KR: Yes, that was numbered SP-19, a shot that will go down in history! It has over 60 different elements – it's the one with the huge number of TIE ships which fly towards the *Falcon* to ambush it, and they all start blasting away.

In general, we didn't go around counting how many ships for each shot. There are hundreds involved in the battle, but we always had to consider what looked best in each frame, and if you have a lot in one, you can imply more than you show because other frames won't have to have as many involved. Some of the shots are filled with action while others had to be less so to accentuate the drama. When we did the asteroid sequence in *Empire,* for instance, we had to drop some of the elements in certain shots because we found that when we had too much happening at one time, the audience didn't know where to look and missed the main action.

V: The asteroid sequence must have been helpful in planning the more complex battles in *Return of the Jedi?*

KR: Every film in the *Star Wars* series is a stepping stone to the next as far as the special effects are concerned. The *Walker* scenes in *Empire* were the basis for the ones in *Jedi.* The new *Walkers* on Endor were developed after we had the experience of *Empire* behind us so we couid give them more flexibility and avoid the problems we faced on the earlier film. The asteroid sequence was also the forerunner for what we've done in *Jedi* because, in its day, it represented the most elements in one shot. Now, for the new film, we've been able to go beyond that.

V: What do you think about Telematics?

Effects Cameraman, Mike McAllister, constructs the special moving mounting for the speeder bike miniatures. The combination of effects used for the bike sequence is one of the most involved of the film. Photo: Kerry Nordquist.

KR: I personally have a lot of reservations. They were interesting to do, but they took a lot of time. I'm not sure we were that much ahead of where we'd have been had we gone from the storyboard right into shooting basic elements and then let George see black-and-whites of that footage. For me they weren't all that helpful but for George they were wonderful because he's an editor. Even though they really didn't lock down anything because the new footage was different, he liked them because they helped him get a feeling for the pacing of the film. Part of the problem for me was that George and the director and producer saw the telematics so much that they started to think of them as the real shots. I had to constantly remind them not to judge the real footage based on the telematics. They saw the video images so much, however, that they got to know them. With the telematics we also couldn't get very complicated so there, too, they weren't that helpful to me.

V: During an interview you gave after *Star Wars* was released, you said you first thought the script for that film represented the ultimate space movie and was therefore too expensive to ever pull off. Do you still feel that way about the new projects that come along?

KR: Every film George does has to be bigger than the last. We've done so much since *Star Wars* that I've learned to never say something can't be done. Now I know it can and I usually say it will be done. Of course, we may all be dead from exhaustion by the end of it, but it will get finished.

V: What will the next *Star Wars* film be like? How will it top *Return of the Jedi?*

KR: It's impossible to 'second-guess' George Lucas, but I've heard him say that the next films in the series will have a completely different look. If we go back and do the first three in the saga, they will seem much more antiquated, as if we were going back to the look of 1920s film. Everything will be old-fashioned. The ships will be more primitive, the costumes more archaic. It should be really interesting.

V: What is it like to work with George Lucas?

KR: I don't think anyone could be better to work with than George. He's got all the integrity in the world, which in Hollywood is almost impossible to find. He tries very hard to make a really good product and give audiences something worthwhile. He does it better than anyone else. He's a real showman yet, personally, he is very low key. It's hard to understand how he can maintain himself and be totally in control at all times. If I were in his position, I'm sure I'd go nuts.

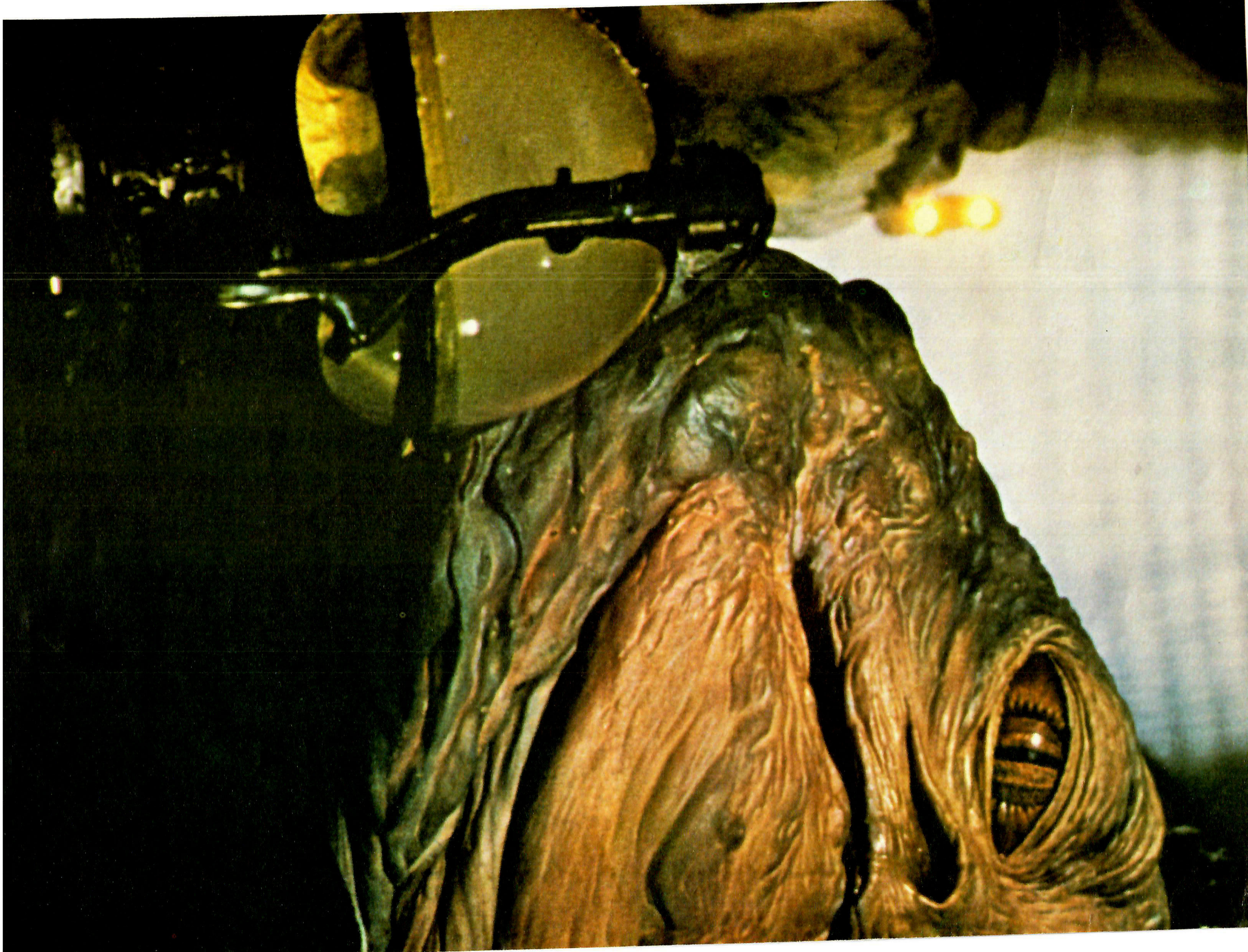
V: It must be hard when you're in the middle of a project like *Jedi* to see the picture as a whole.

KR: Working on effects pictures can be both very satisfying and extremely frustrating at the same time. It's so difficult to get any feeling for the whole movie or to let yourself enjoy it because you're always concerned about all the details needed for the shots. You just don't experience any immediate satisfaction. To produce the dreams, you have to go through the nightmares.

As much as I complain about it, though, it's still a great challenge to see if we can make the effects come alive. In a way, we're doing magic, trying to convince the audience it's seeing worlds that don't exist in reality. To make something believable using models and other fake objects is really fun.

For me, seeing the film in a movie theatre is still the pay off. During post-production, we see some of the reels as the film comes together, but they're usually without sound and music. It's so nice to be able to sit in a theatre and not have to worry about the effects anymore. We get to relax and just enjoy the film. What I like most is then to go to one of the theatres in the area during opening week and watch the films with a regular audience who've been foaming at the mouth waiting to see them. That's when my ego gets its greatest satisfaction, watching people enjoy what we've created . . .

To be concluded



COMMUNICATIONS BANK

Photo: © 1982 Lucasfilm, Ltd.

The saga continues

Dear Sir,

I have just finished reading the fourth copy of your magazine and can only say that the features on the *Star Wars* trilogy are well worth a second read.

After seeing *Return of the Jedi* recently, I sat down and compared the feature titled the 'Star Wars Genesis' with the saga to date. It appears that George Lucas, even in the beginning, wanted to create some kind of family tie-in with the main characters like Luke and Leia. What also struck me was the similar types of battles that took place between the Imperial Forces and the Ewoks. You may ask, *what* similarities? Well, if any readers of *VOYAGER* have read 'Splinter of the Mind's Eye' they may already know. In it, a tribe known as the Coway confront the Imperials in a very similar way, led by Luke and Princess Leia.

Although 'Splinter of the Mind's Eye' was never made into a film maybe George Lucas wished to show a confrontation between a high technology and that of a low one in some way. If one looks into the history of the *Star Wars* universe one may also find out more of what the *Star Wars* story is all about.

In the early writing of *Star Wars,* there were ideas of a crystal that could amplify the power of either side of the Force. This was then known as the Kyber crystal. In 'Splinter of the Mind's Eye' the idea arose again but this time it was known as the Kaiburr crystal. Maybe the idea will come to light again on the large screen in one of the other episodes.

Spennymoor, Co Durham *Paul Trueman*

Dear Sir,

As I was reading the 'Star Wars Genesis', I spotted a few mistakes. In the part where Randy and Jean said something about the fourth draft, they got the date wrong. The fourth draft was dated January *15,* 1976, not January 1. The production of the film started in 1975 when **20th Century Fox** gave the go-ahead. Even though the novel was written by Alan Dean Foster, but credited to George Lucas, his original concept for the film was on a planet full of Wookiees and at that time Luke was a girl. She was a princess who is trying to rescue her brother and so she hired Han Solo to help her and Han looked different; he was old enough to be her father.

Then George changed the story again this time about Artoo and Threepio. He liked the robots so much he kept them in the story, and when the fourth draft was completed, there had been a lot of changes. Luke is a boy, Han is young-looking and Leia (George retained the 'L') is a girl.

When George submitted a script to Sir Alec Guinness, he wouldn't accept the role of Ben Kenobi unless he changed it. And so he did, with the help of Sir Alec. Throughout the entire script, all of the scenes had been filmed, but some scenes were cut out (about 20 minutes worth) which left the film to run just over two hours.

From the clues from the two movies, I managed to find out more about Leia, Luke and Vader.

1. I always thought that Vader would be a cyborg. Remember the way he lifted up the Rebel in *Star Wars?* It must have been both his arms, but not totally. Luke managed to cut him in 'Empire', so it must be from the upper part of the muscle all the way down to his hand.

2. Remember when Yoda was talking to Luke about his father? He said, 'Powerful Jedi was he, powerful Jedi.' That meant that he was talking about Vader. There was no other Jedis left apart from himself.

3. Remember when Luke was under Cloud City contacting Leia? Now if she hadn't a little of the Force in her, she wouldn't have heard him which means they must have been related in some way. Remember when Yoda said, 'No, there is another'?

4. In the first film, we don't actually see Vader torturing Leia but if he wanted her dead he would have done it himself.

I have seen *The Empire Strikes Back* and *Star Wars* five times each which has given me enough chances to sort out the clues. After working these out for myself, I decided to see *Return of the Jedi* and my hunch was correct. But I did find something missing. In *The Empire Strikes Back,* all we see of Vader without his helmet is the back of his head. It was all ugly tubings, now in *Return,* when Luke takes off his helmet, you don't see any of that.

The next *Star Wars* film we will see is Episode 3. By the way, George is making the first trilogy in reverse order; maybe he can't count.

In the late sixties, Gerry Anderson came up with a series called *Joe 90* and the plot of the series is along similar lines as *Star Wars.* In the very first episode, Professor McClane claims that Joe's parents died when he was very young and so he took up the guardianship of Joe, even though Joe keeps calling him Dad. He has no memory of his parents whatsoever, the same as Luke. Joe was only nine at the time.

London, SE15 2BW *Phillip Rochester*

Dear Sir,

Love the magazine, having bought it from the pilot issue. I believe *VOYAGER* is unique in successfully covering just about every aspect of science fiction, fact and fantasy and maintaining a good balance between subjects with excellent presentation standards; praise which I am sure you have received many times. I, like many other readers it seems, enjoy the film, TV and modelling articles the most, but find everything of interest.

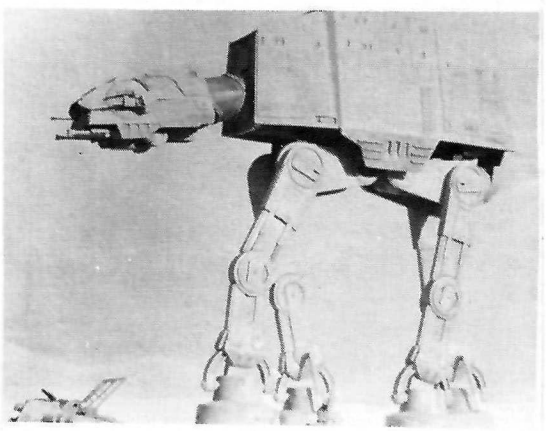
Comparisons may be made with the only other related magazine from Britain, and with which I see you have an interest in, *Starburst. Starburst* began well, gradually improving and reaching a peak. Unfortunately, this standard was not maintained and, though I still buy it, *Starburst* is not the publication it was. Interestingly, it was *VOYAGER* that was first to present a feature on *Return of the Jedi;* I believe the two magazines can quite happily co-exist, but *VOYAGER* has the edge.

The modelling articles are good generally, dominated by the *Star Wars* saga as to be expected, and of which I am a fan. Try to diversify, though, like the *Blake's 7 Liberator* piece in the pilot issue. I would personally like to see accurate drawings and information on hardware, etc., that is not available in kit form. How about some of Gerry Anderson's classic pieces? (Though SIG are beginning to work their way through some of these.) I personally find it quite incredible that some of the marvellous futuristic hardware that features in Anderson's shows was almost totally neglected by British plastic kit manufacturers.

One other point I would like to raise about the present run of relevant kits is the overall standard of moulding, etc., that, in my opinion, seems to fall way below standards set by established manufacturers of conventional kits. I realise this is due to conflicting, or lack of, reference material, etc., but the biggest hindrance seems to be the attitude of some of these manufacturers who aim at a market consisting of children under 10 with kits containing about the same number of parts. Those who have purchased the **MPC/Airfix** *Millennium Falcon* might have realised that, although the overall accuracy is good, the lack of detail in many areas and overall simplification means that a fair amount of work is required to successfully capture the 'feel' of the ship.

Another complaint concerns the price of

Leyton Parker's AT-AT realistically posed in this dramatic photograph.



PUBLISHERS' NOTE: The editor reserves the right to shorten letters for publication; opinions expressed by readers are not necessarily those of either the editor or publishers.

some of these kits. £6.00 for the *Star Wars Snowspeeder,* which is no bigger than a **Monogram** 1/24th scale Chevy. The strange thing is that the *Snowspeeder, Battle on Hoth, AT-AT, Rebel Base, Dagobah* and *Slave I* kits are all around the same price, whilst they all vary in size, number of parts, etc.

Thankfully it appears that **MPC,** at least, are improving with experience and some of the recent releases such as the *AT-AT* and *Slave I* produce good miniature replicas of the models seen in the films. Even the artwork on the boxes is looking better.

Anyway, I could discuss this subject for hours, suffice it to say that I hope *VOYAGER* maintains its present standard of excellence as a publication. As it is, *VOYAGER* is Britain's answer to all the American magazines that have dominated this particular market.

To coin a well known phrase, 'May the Force be with you'.

Kempsey, Worcester *Leyton Parker*

Blade Runner

Dear Sir,

Just a few words to congratulate you on a great mag. What I really find commendable is the way you don't mix up science fiction with science fact, a mistake a number of your predecessors made. Well done.

Next, I thought that I would send you a bit of info for your Sound and Vision column. I'm a fan of Vangelis and the story of the *Blade Runner* soundtrack has one or two omissions at the moment. Mat Irvine was right to say (in issue No. 2) that Vangelis didn't think the music was 'good enough' as a follow-up to *Chariots of Fire.* However, Vangelis did give the go ahead for his friend, Dick Morrisey (Dick Morrisey was a member of Jon Anderson's backing group, and he also played Sax on the *Jon & Vangelis* album, *The Friends of Mr Ciaro)* to release a single of the theme music. The single is called *Blade Runner* and is by Morrisey-Mullen. It is available at most good record shops on **Beggars Banquet** records number Beg 87. The record is a jazzy version of the theme, and not to everybody's taste but it comes with a good picture sleeve.

Now just a follow-up to something Mat Irvine said in issue No. 3, writing about the *Blade Runner* record by the New American Orchestra, he says, '. . . I can't help wondering what a Vangelis Soundtrack would sound like.' and '. . . music composed for the Synthesiser and played by Orchestra, sounds as though the orchestra is getting its own back'. One easy way of testing this is the track from *Blade Runner* called 'Memories of Green'. There is the orchestrated version mentioned previously, but that track first saw the light of day on the 1980 Vangelis Album *See You Later.* Anyway, keep up the good work.

Staleybridge, Cheshire *David Leech*

Space modelling

Dear Sir,

I want to congratulate the whole staff of *VOYAGER* on an excellent publication. A magazine such as this has been needed for a long time and is much appreciated. I hope you can continue the fine articles covering each subject. This is the only magazine at the present time that combines all aspects of Real Space subjects and SF and Fantasy under one cover. Keep up the good work. I have only one complaint and that is that the magazine is not easily available in the USA. I am fortunate in that I have a very good friend in your country who air mails the magazine to me as soon as it reaches the news-stand. Unfortunately most people are not so lucky.

I am especially interested in your coverage on Space Modelling. This is a subject that is generally overlooked. I personally have written several articles on SF Movie/TV related kits and lean towards 'accurising' existing kits by providing info that I have found, such as drawings for the nose gear on the *Buck Rogers Starfighter,* etc. My argument has been that even if these are not 'real' ships, there was a real model or mock-up ship in the filming. So that is what I base my model on for details, markings, paint scheme, etc. Unfortunately, most existing kits are not accurate or certain details are left out such as instrument panels and landing gear.

I thought the letter by Mr Watkins and the reply by Mat Irvine in Issue 3 were very interesting. I, too, agree with a lot of Mr Watkins' views on SF modelling, especially in the treatment of SF modelling by other model enthusiasts of established categories. There is definitely as much time, or more, spent in building and finishing an SF model. In scratch building there is more time involved in planning since there are no plans available in most cases. In 'accurising', as I do, there is more research time since this info is not readily available. You can obtain drawings, pictures, decals, etc., of an F-15, P-51, or Spitfire from many sources. Where can you find this info for an *X-Wing, Viper,* or *C57D Space Cruiser?*

In judging SF models, I find that anyone familiar with judging can judge workmanship on *any* model. But who is qualified to judge the complexity in building an SF model but someone that has *built* this type of model? Most of these people are the same ones that are entering the models so they are then disqualified. Unless the judge is familiar with most SF kits he does not realize that these kits in most cases do not go together well. The quality of SF kits has not reached the degree of excellence by the manufacturers as aircraft and armour kits has in recent years.

I feel your MEE has a very good breakdown of categories for SF models. We are still striving for a better category breakdown at the IPMS/USA National Convention. In 1982 we offered the following; 1 Real Spacecraft and Vehicles from kits; 2 SF and Fantasy Vehicles – from kits; 3 Conversion and Scratchbuilt – all types. No. 3 was a new category offered for the first time. This year the 1983 IPMS/USA National Convention will add one more category – 4 Hypothetical Spacecraft.

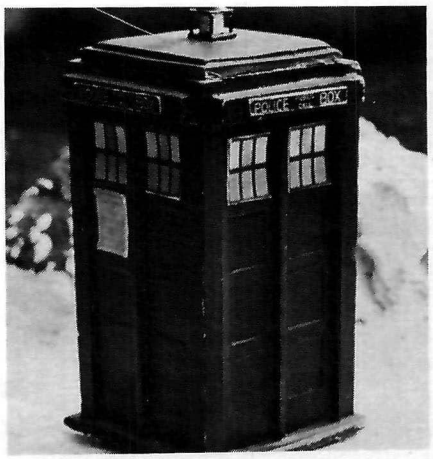
Missouri, USA *R L Scott*

A note from your technical editor

In an attempt to clear up the confusion with cyrillics which has been hanging around since issue 2 and my interview with Arthur C Clarke, the original correction I made in Issue 3 *(Captain's Log)* was purely to add Cosmonaut Beregovoi's credit as just that – cosmonaut. The original picture caption, page 12, Issue 2 of *New VOYAGER,* had just the name 'Beregovoi', which I felt was somewhat bland. The fact that this also contained the translation error of a 'u', where it should have been a 'v' was almost incidental and unfortunately slipped through both this copy and the subsequent correction. Reader Evans-Gunther pointed this out in Issue 4, though, here, problems arose with our inability to print the correct cyrillic of Beregovoi, the final result of which was interesting to say the least! Incidentally although I make no claims about being able to understand Russian proper, it has been extremely useful to know the cyrillic alphabet which, itself, is a mixture of Latin, Greek and even Chinese characters, for a great number of Russian words – particularly technical and scientific – are pure phonetic translations from English, which, if one knows the alphabet, invariably gives some semblance of sense to the Russian piece.

Changing the subject, thank you to Marion van der Voort for mentioning the stolen *Tardis* from Longleat, although I should make it clear that it was, strictly speaking, the BBC's property, although I did actually make the model over ten years ago and it had a certain amount of sentimental value. It was, however, showing its age somewhat and if it fell apart on whoever nicked it – well, that's poetic justice.

Mat Irvine

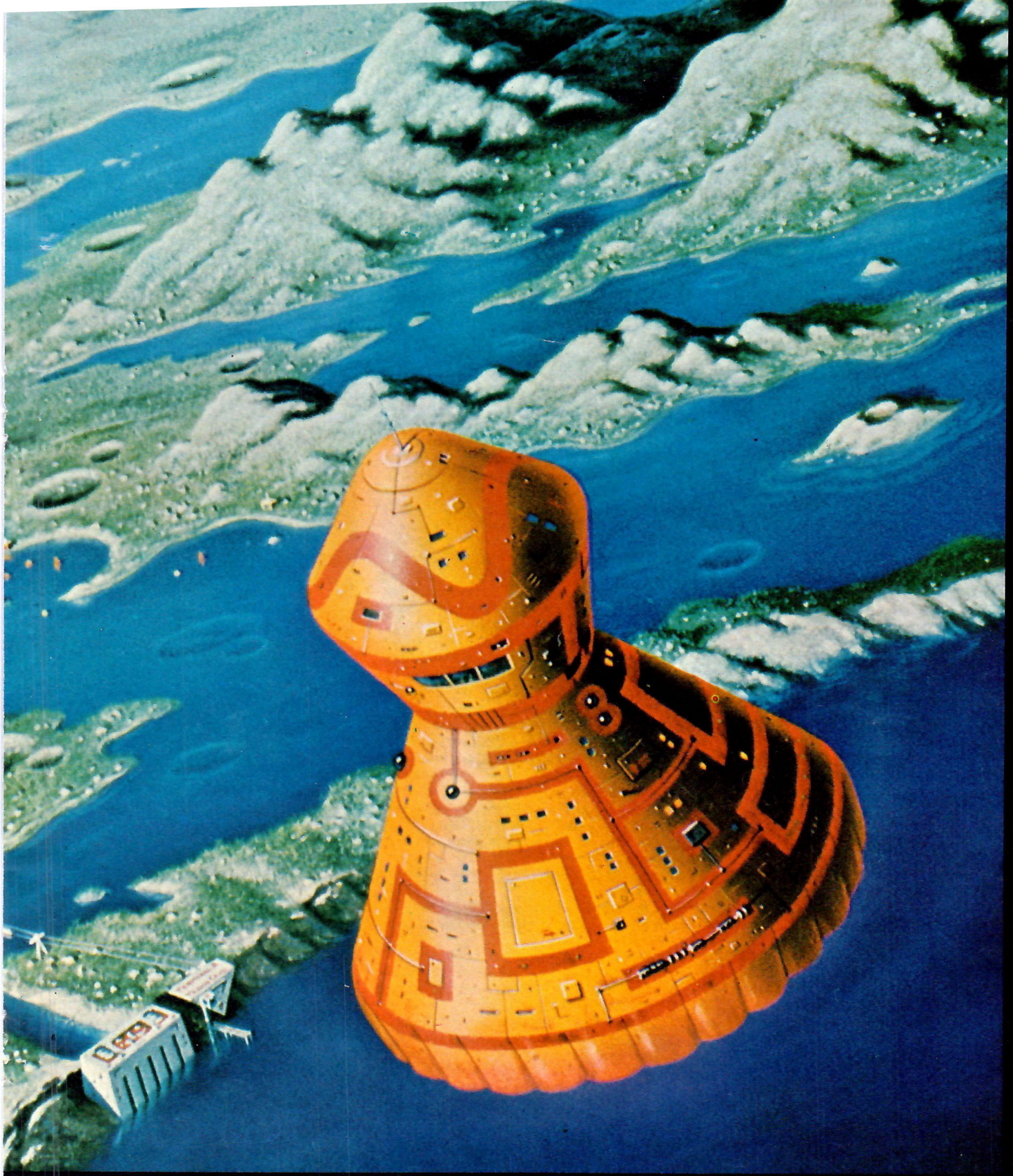


Mat's missing Tardis, – Who's got it? Anybody finding it should contact the editors!

New VOYAGER magazine will despatch a free gift to all those whose letters are published in this column.

TERRAFORM

WRITTEN AND ILLUSTRATED BY DAVID A HARDY



MING

For many years, one of Man's highest aspirations has been to discover other worlds on which life can (or does) exist or, in some ways equally important, which he could himself inhabit without the need for protective devices such as pressure domes or spacesuits. A few hundred years ago – once the invention of the telescope had shown planets of our Solar System to be other, solid, worlds – many people believed that they must all be inhabited. Even in this century it was assumed that some of the planets might be habitable by humans, with only slight assistance. Venus and Mars, certainly, seemed to be almost twins of Earth; science fiction stories were also written about life on the far side of the Moon, on Mercury in its 'twilight zone', or on the satellites of Jupiter. . .

The advent of the Space Age has revealed the planets of our Solar System to be inhospitable, to say the least. Modern instruments, and probes such as the Mariners, Vikings and Voyagers have shown that Mercury is much too hot, and has no permanent zone between 'night' and 'day'; it also has hardly any atmosphere. On its sunlit side the temperature rises to around 450°C, while on the dark side it drops to −175°C. Venus, too, can offer temperatures of over 450°C, while the pressure of its atmosphere is 100 times that of Earth's at the surface and there is a constant rain of sulphuric acid! By contrast Mars looks familiar – but the atmospheric pressure is less than 1% of Earth's, and the highest surface (not air) temperature in Summer is 20°C, while it can fall to −80°C at night.

Not surprisingly, perhaps, it was in science fiction that the term was coined which is now generally used to describe one of the most ambitious schemes yet envisioned by Man – yet one which could conceivably be more practicable than interstellar travel to provide habitable worlds: 'terraforming' – the shaping of other worlds to make them Earthlike.

Jack Williamson first used the term in 1942, although he had written about mining the asteroids in 1933, in *Salvage in Space*. In 1930, Olaf Stapledon's classic *Last and First Men* had also proposed converting a hostile Venus to suit Man, although at that time he assumed it to have vast oceans.

The idea of planetary engineering ('macro-engineering' as it is now sometimes called) had also been proposed outside SF. The American astronomer Percival Lowell, at the end of the 19th century, observed the 'canals' first announced as *canali* (channels) by Schiaparelli from Milan Observatory in 1877, and decided that they consisted of a network of great artificial watercourses driven through the red deserts by intelligent Martians to prolong life on their dying planet.

Later fictitious terraforming projects were described by Robert Heinlein in *Farmer in the Sky* in 1950, the world in this case being Jupiter's moon Ganymede, also the scene of Poul Anderson's *The Snows of Ganymede* in 1955 and Gregory Benford's *The Jupiter Project* in 1975. But Anderson chose Venus for his *The Big Rain* (1955), while in 1957 Arthur C Clarke made the atmosphere of Mars breathable by humans in *The Sands of Mars*.

But when most of those stories were written – and when Lowell proposed his imaginative theory – it was still thought that the atmosphere of Mars was considerably more dense than it has proved to be, and that both it and that of Venus might contain considerable quantities of oxygen and water vapour (essential to life as we know it) at depths out of reach of our spectroscopes. Surely, in the light of the recent evidence on the hostility of our neighbour worlds, no-one would seriously advocate trying to convert them into 'New Earths'?

The fact is that modern discoveries have gone hand-in-glove with modern technology, together providing knowledge that makes such massive projects quite feasible – providing there is sufficient incentive, such as relieving Earth of the pressure of its rapidly-growing population. Space colonies, such as those envisioned by the L-5 Society, may be another answer to that problem, but it could prove better to start with the 'solid base' of an existing planet.

Before we start tinkering with alien worlds, though, we must be quite certain that no indigenous life-forms exist on them. Despite my opening paragraph, the discovery of life already existing elsewhere is quite a separate issue; proof that 'we are not alone' will have enormous philosophical implications for the human race. It now seems very unlikely that any advanced life-forms exist within our own Solar System, but even the discovery of an alien virus, algae – or fossil – should be sufficient to stop us from claiming its world as our own. Man's record is appallingly bad in this respect, even on his own planet; the number of species of flora and fauna rendered extinct by human activities grows almost daily. Once, this was unwitting, but there is no longer any excuse, and certainly we must not carry our thoughtless plunder out into space.

It could also be argued that we have already started terraforming our own planet – though not to improve conditions. The huge quantities of carbon dioxide pumped into our atmosphere over the last century or so by the combustion of fossil fuels is very probably altering the balance of Earth's climate. The creation of new deserts, diversion of waterways, de-forestation, 'acid rain' and pollution of oceans are other examples of adverse macro-engineering. Maybe our first goal should be to redress the balance on our home world?

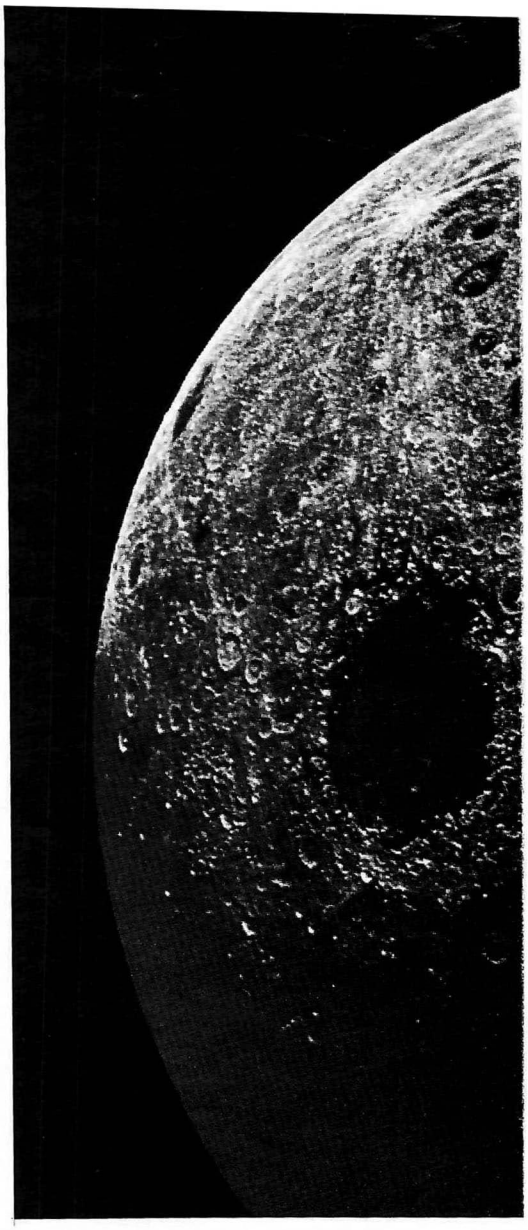
Meanwhile, meteorologists in many countries are actively engaged on developing methods of 'local' weather control – which could still upset the balance of areas hundreds of miles away. Should we defer any attempt to alter other worlds until we have safely mastered the techniques (aided by advanced computer simulations) of improving human comfort on our own? Or could experiments perhaps be more safely performed away from Earth?

Let us suppose, though, that at some date a few hundred years in the future (and it could be sooner) we have thoroughly explored, charted, documented and photographed (holographically, of course) the most suitable candidates for terraforming, and found no trace of life on them. How could we set about the job?

The least promising candidate may seem at first glance to be our Moon, but it is at least close at hand, so if we are successful the problems of ferrying in its new population will be minimised. Also, if we can successfully terraform the Moon, other relatively airless planets should pose few problems!

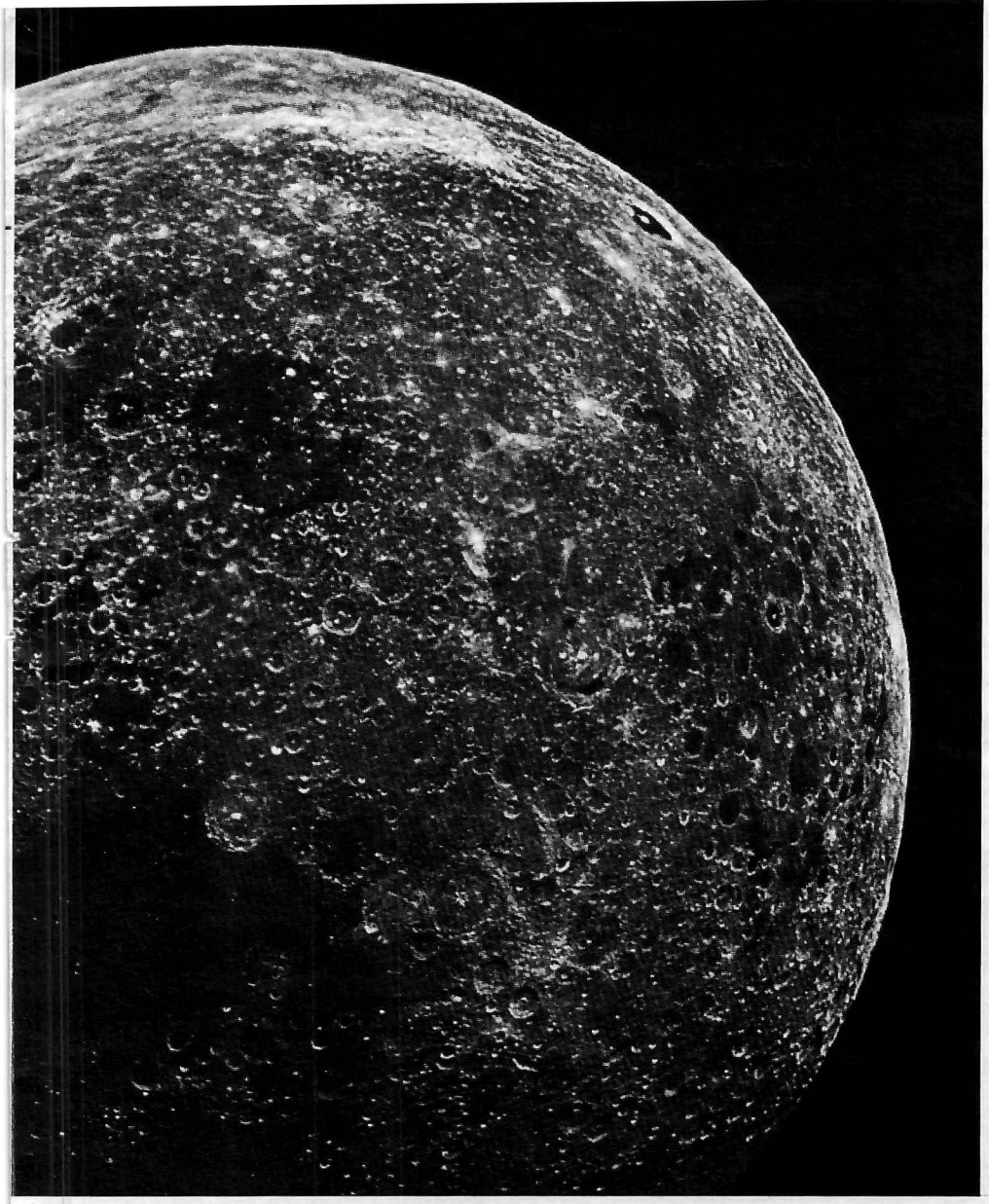
An essential material and 'tool' for terraforming is to be found in the regions of the Solar System between Mars and Jupiter, or beyond: asteroids. In particular, asteroids composed almost entirely of *ice* would be useful; or we may have to employ the nuclei of comets. The first requirement in the case of the Moon is to increase its rate of spin. The present extremes of temperature are as much due to the fact that it rotates on its axis (its 'day') only once in a month – 27.3 days, to be precise – as to its lack of atmosphere. So we attach rockets to an 'iceteroid', using its own material as propellant mass, and arrange for it to crash into the Moon at a controlled angle and speed.

Each impact by a 10-mile diameter iceteroid will add part of its 60 miles-per-second velocity to the Moon's rotation, until it approaches a 24-hour day; 30 or 40 hours would probably be acceptable, except for Man's inbuilt physiological 24-hour clock. At the same time, the ice will melt, providing essential water and producing the Moon's first genuine oceans. For the first time in its 4.6 billion year history, the dark areas seen from Earth will actually contain water, and such evocative names as 'Sea of Serenity' and 'Lake of Dreams' may have real meaning.



Water alone is not sufficient, of course. An atmosphere containing oxygen has to be created. This might be done by baking the oxygen out of lunar soil with parabolic reflectors placed in orbit around the Moon; there is no objection to mirrors several miles across in space. Underground nuclear blasts have also been suggested to release oxygen, but the mirrors may be preferable since it would require 10 kiloton bombs to produce the same result as one 1-mile mirror operating for less than a year; that is, increasing the lunar atmosphere to a point at which it would remain stable and last for 100 years or so.

Several hundred more blasts, or a number of reflectors operating continuously for several years, would create appreciable air pressure. On the human timescale, a breathable atmosphere would last for an indefinite period – thousands of years at least – once formed, and if we could create it we could certainly replenish it. The next (or parallel) stage would be to introduce plants and animals, including insects and bacteria, etc., so as to arrive at a controlled, viable ecological system. Then our



Would our own Moon be a suitable candidate for Terraforming? The idea may well be closer to science fact than science fiction...
Photo: NASA

descendants will be able to take up residence.

Other worlds

Mercury may seem even less promising than the Moon, on account of its proximity to the Sun, and certainly we would expect to terraform more amenable worlds first. However, the same basic methods could be used, except that some form of shelter from the intense solar radiation would have to be fabricated; an umbrella, in fact. A cloud of rubble thousands of miles across, hanging in space at the inner Lagrangian point between the Sun and Mercury (as a Lagrange or L-5 Colony remains relative to Earth and Moon) might do the trick; but a better idea may be the creation of artificial rings, similar to Saturn's, round Mercury. There could be several rings at different angles and heights, casting overlapping shadows and cooling the surface. Naturally the rotation period would have to be adjusted first, by ice asteroids. The material for the rings or cloud would be obtained from rocky asteroids, pulverised and delivered by some form of mass-driver or electromagnetic catapult. In the present state of our knowledge it does seem that the human race would need to be rather desperate (or in need of a new challenge) before attempting such an undertaking!

Mars, on the other hand, appears much more promising. It receives only 60% as much solar energy as Earth, so needs warming up. It also needs a much denser atmosphere. The evidence of what appear to be dried-up river beds suggest that Mars *was* once warmer, and that liquid water existed; today this may be present as permafrost under the surface.

A NASA study entitled *On the Habitability of Mars* (1976) states that there is no fundamental reason why Mars could not support terrestrial life. The method envisaged to enable it to do so is a long-term one, taking tens of thousands of years to produce an atmosphere and climate suitable for humans. An ozone layer is also essential, to protect the surface from deadly ultra-violet radiation from the Sun (this applies to the Moon and Mercury also). What is needed on Mars is some way of increasing the amount of infra-red radiation (*ie,* radiant heat) absorbed by the polar areas, unlocking the water vapour and carbon dioxide locked up in them as ice and dry ice. Once the atmosphere is thickened in this way, genetically-engineered blue-green algae would convert CO_2 into oxygen and carbon by photosynthesis. The process would eventually become self-sustaining. But how could it be started?

The tiny Martian moons, Phobos and Deimos, have been found to resemble carbonaceous chondrites, a type of asteroid (which they probably are, captured by Mars' gravity) which are the darkest objects known in space. A mass-driver on one or both of them, ejecting dark material onto the Martian poles, would increase the polar energy flux. The process could be accelerated by using mirrors – perhaps transported (folded or rolled) from the Moon, if their task there was complete – to concentrate solar energy at the poles. The released CO_2 and water vapour would create a 'greenhouse effect', trapping infra-red radiation within the atmosphere instead of allowing it to be lost back into space.

SF author Jerry Pournelle has suggested that nuclear explosions inside the huge extinct Martian volcanoes may trigger outgassing to thicken the atmosphere, though again this may be a hazardous process. But by the time we are ready to try it, our science should be equal to such an experiment. Moistening the Martian soil and encouraging vegetable life to proliferate will cause the atmosphere to become clearer, since the dust at present suspended in it, causing the famous 'pink sky', will gradually be reduced. This in itself will also allow more solar radiation to reach the surface. As extremes of temperature are ironed out, dust-storms will become rarer.

Once the atmosphere is, say, 100 times thicker than it is today, it will achieve a new stable state. Necessarily, the above scenarios are greatly simplified; planetary ecologies are immensely complicated, and factors such as conversion of native sand and rock into soils, the accumulation of organic substances from raw materials such as carbon, nitrogen, oxygen, hydrogen (all present in the carbonaceous material from the moons, and an excellent basis for fertiliser), sulphur, phosphorus, etc., and food-chains, are essential and time-consuming processes. But the problems will probably not seem insuperable to 22nd or 23rd century ecosynthesists.

Venus, because it is so close to Earth in size and gravity, and already has a dense atmosphere, presents unique hope as well as challenge as a second Earth. It was Carl Sagan who, in 1961 (before we had our present knowledge of the atmosphere's corrosive nature) suggested that the clouds of Venus might be 'seeded' with blue-green algae or similar anaerobic micro-organisms to convert the carbon dioxide of which the Venusian atmosphere is composed into carbon and oxygen. Blue-greens, as they are more correctly known, do exist quite happily around the sulphurous vents of hot springs on Earth, but genetic engineering would quite probably be needed to produce a strain capable of withstanding Venus' sulphuric acid rain. Even this is far from impossible.

As with the Moon, we would need to alter the rotational period of Venus to give it a 24-hour day instead of taking 243 days. This faster rotation would also cause the iron core of the planet to generate a magnetosphere like

Earth's, forming a shield against radiation.

Ice asteroids would again be guided in to crash into the planet, using computer-controlled jets to ensure the exact angle and point of impact. As it approaches the Sun, an asteroid containing ice, methane or ammonia would outgas, giving the effect of random steering jets which would need constant correction. Only a computer could achieve this. Then, in the case of Venus, we should need not to create a greenhouse effect but to break the runaway effect already existing. The algae would help to accomplish this by freeing oxygen and reducing the CO_2.

As might be expected, impacts of the type envisaged will have widespread effects on the planet. Too large, too fast, or at the wrong angle (*eg,* head-on) and the planet could even shatter. The largest asteroid practicable would produce an impact comparable with that which formed the Caloris Basin on Mercury. But since Venus has a dense atmosphere, shockwaves will spread out from the impact point and move round the planet. The body will be moving faster than the speed of sound in the Venusian atmosphere (about $1\frac{1}{2}$ times as fast near the surface as is sonic velocity on Earth), so considerable heat and compression will result.

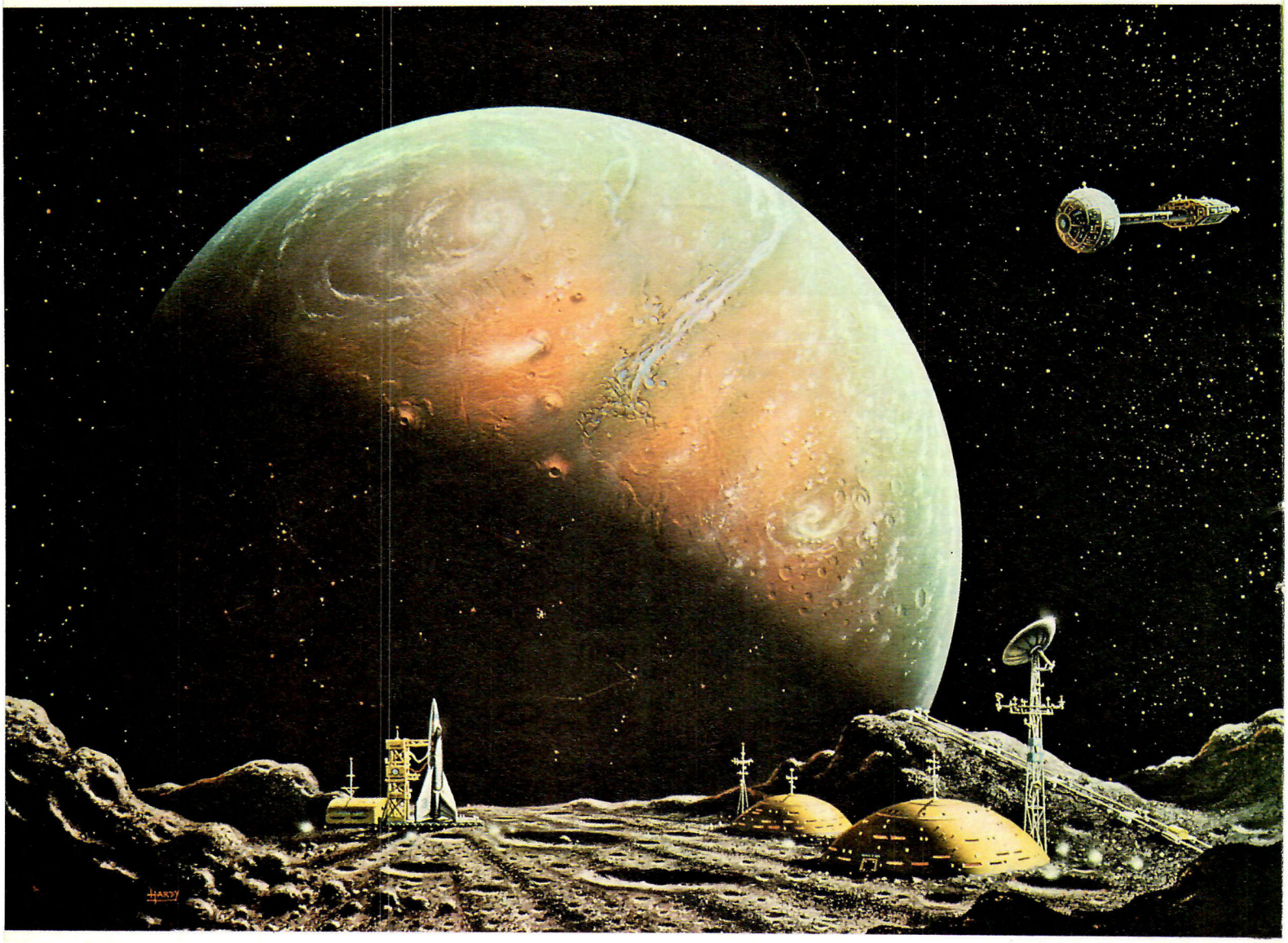
There will be giant shockwaves in the interior of the planet, too, causing incredible 'Venusquakes' and mountainous eruptions of molten rock. The asteroid itself will quickly be shattered and melted. Eventually, equilibrium will be regained. However, we need to know much more about the interior of Venus before contemplating such a project, because if the wrong type of gases were released by the impacts, it could have the opposite effect to that desired.

Still sounds like science fiction? Well, so it is at present, of course. Even if there were a vital need to move to another world, with full international co-operation, our present technology would be stretched to the limit to achieve any of the above scenarios. What is important is that research on projects of this type continues actively; then, when the time *is* ripe, we shall be ready.

Remember that SF writers and scientific 'cranks' (*eg,* members of the British Interplanetary Society – still going strong) were proposing trips to the Moon and planets long before the first lunar landing. The BIS, in particular, put forward solid proposals in the 1930s. Yet few predicted that technology would permit a manned Moon-landing before the year 2000 . . . *

PUBLISHERS' NOTE: A limited-edition, signed print of David Hardy's painting 'Terraformed Mars' measuring 340×485 mm, is available by post, price £8.30 including VAT, etc., only from ASTRO ART, 99 Southam Road, Hall Green, Birmingham, B28 0AB. A SAE will also bring details of other posters and books.

Below, Terraformed Mars. The view is from a base on Phobos, the inner moon. On the right can be seen part of the mass-driver used to launch dark material onto the polar regions, increasing their absorption of infra-red radiation and melting the ice. From 'The Solar System' by David A Hardy, World's Work, 1982. *Right, a Lunar Tourist Centre. The low gravity allows impossibly high-looking diving boards, man-carrying kites, and pedal planes. The domes of an original lunar base now form the Tycho Hotel!* David A Hardy, from 'Galactic Tours' by the author and Bob Shaw, 1981.



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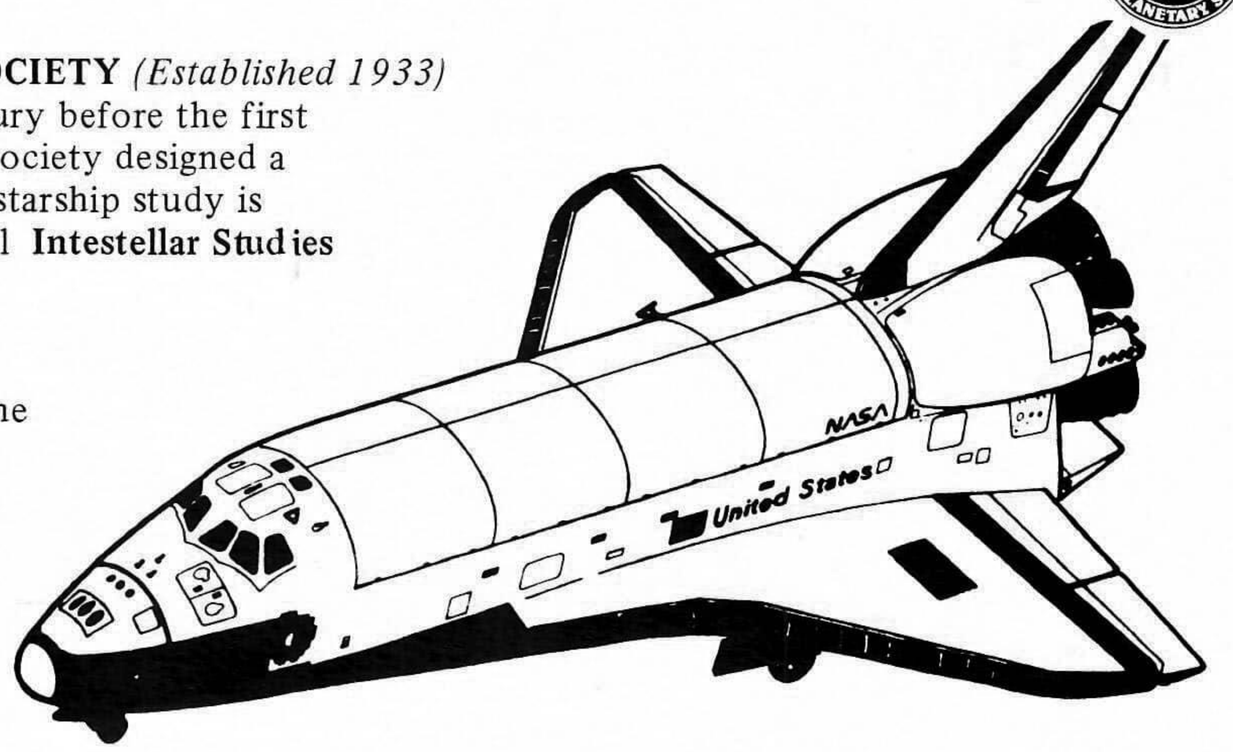

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WENDY GRAHAM TALKS TO MICHAEL KEATING

VILA LIVES!

'Vila lives – he was only stoned!' reads the latest Abel-Label to circulate in *Blake's 7* fandom, and it just about captures the feelings of most fans of the would-be inventor of the eighth deadly sin. For, while Avon was the sort of person we would all like to be – charismatic, brilliant, always about three steps ahead, Vila was very much the person we really are – average-looking, weak-willed, but still able to come up trumps when necessary.

And Avon needed him. Fan fiction, picking up where the BBC killed off, invariably has Vila as the survivor of Gauda Prima, with Avon. So, when Michael Keating recently came to Blackpool as a member of the cast of *Anyone for Denis* I jumped at the chance of reviewing the production for a local paper and meeting him. Then it was that I realised what a fine actor Michael is. Many actors tend to play similar parts all the time. But in one play, there was Michael as two totally different people; the crusty, lushy Major Jump, drinking companion of Denis Thatcher, and *Monsieur* Chambertain, the suave Frenchman who tries to seduce Margaret Thatcher!

His skill was such that a colleague with me, who had watched *Blake'* far more than I, failed to recognise him. Chatting after the show I persuaded Michael to attend the next meeting of the local science fiction club, which he did, to the delight of members.

Michael has been doing movement classes to keep fit, 'Though that's gone by the wayside since I've been up here', he said as we chatted in his dressing room at the Theatre Royal, between his times on stage:

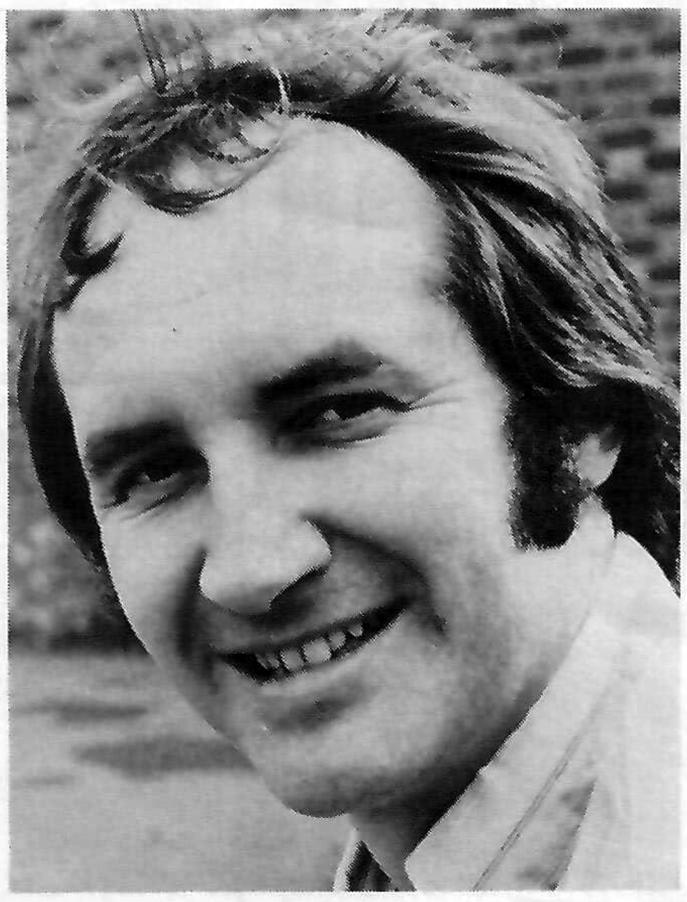
'I went up to Edinburgh last week, and while I was looking round the castle an Australian came over. *Blake's 7* has just been repeated over there and he had recognised me.

'I love being recognised. It's wonderful for the ego. But, strangely, I seem to be spotted much more in the North than in the South. It seems that northern people are much more interested in science fiction than southerners.

'No, I don't mind being stopped – as long as they don't throw something! And no, I don't think the fans are mad as hatters either. . .'

'I'm always amazed at the popularity of *Blake's 7,'* said Michael, 'I've even been invited to a convention in Florida – I'd love to go, but it overlaps with the end of the Panto. (**Omnicon** – with Peter Davison and Sandra Dickinson flying the Union Flag). 'It's amazing that they should invite me – *Blake'* hasn't even been shown in America, but I hear there are already fan clubs.

'I've been told that I've also been invited to a convention in Australia next year, though I've



not heard officially and I'd love to go back there. (He spent part of his childhood Down Under.) I enjoy going to cons, I think they're marvellous things, great fun. It seems that *Blake'* fandom is growing, not dying. But, though it's sad, I really don't think that there will be any more *Blake'* made for TV. It's been left too long now and we're none of use getting any younger. But, a movie might be possible – if someone wanted to make it.'

'But, maybe there will be a spin-off with Paul and Jackie. After all, Avon and Servalan didn't die! The last scene I filmed wasn't the death scene, it was one in the flier, on November 7, 1981. Then we had a bit of a wrap party, we all felt a little sad, and the next day we were out of work. *Blake'* was going to be finished after the third series, and it was the fans' letters which tipped the balance there.

'I thought the last episode went too quickly though. After 52 episodes and however many hours; bang, bang, bang – we were all dead in the last two minutes. And it was shown just days before Christmas. Totally wrong timing. Upset many people.'

By contrast, the funniest moment for Michael in *Blake'* came during the third series, with location work on 'Moloch' when he had to take part in a fight:

'Vere Lorrimer was directing and, because he's that sort of director, he grabbed me to show the whole crew exactly what sort of fight he wanted. Well, we slugged away and then rolled over and over down this slope, through bushes and so forth.

'Then Vere bobbed up and told the stuntman that that was what he wanted. The stuntman thought for a minute and then told Vere he couldn't possibly do it. It was much too dangerous. Vere was nearly 60 then. . .

'Of course I would always be interested in doing other science fiction, though. I was always interested in SF – H G Wells, Jules Verne, and the like – but it was my cousin Alan, who lives in Canada now, who was the real SF fan of the family.

'But really I love the theatre. As an actor I can be more in control of what I'm doing and, of course, you get an immediate response.'

Michael describes himself as a journeyman actor who likes to play all sorts of roles. He was Gold Medallist of his year at the Guildhall School of Music and Drama where he first concentrated on more serious theatre, including Shakespeare, and was even a member of the National Theatre for a time.

Keating's favourite actors include Jack Lemmon, Paul Schofield, Albert Finney, Lord Olivier, Jack Nicholson, Gareth Thomas, Paul Darrow, Jan Chappel and Tony Pedley, while his hobbies include dancing, cycling, walking and reading; he is one of those lucky men who can also count his work as his hobby as well. But it is Michael's catholic interest in knowledge of any sort which catches attention. He will listen eagerly to any expert, while at the same time sending himself up, either by telling long and totally credible stories about his times in the SAS or what a fellow professor told him at Oxford last week.

Turning to Michael's best-known and loved role, Vila Restal. Most people condemn Vila as a womaniser, drunkard and coward, but Michael is quick to defend his alter ego:

'Vila was not a coward – he was just sensible, and as for the drunkard and womaniser, what's wrong with a few drinks and a man's eye for a pretty woman? Anyway, half the time Vila was only pretending to be drunk for one reason or another. Remember, Vila was the only one of all of them who definitely got the girl. . .'

At one time Michael thought that if Vila had survived Gauda Prime he would have gone off to find Kerril, but now he has changed his mind. 'I think that while what they had was a genuine emotion, it was born of the time, place and the situation, and would never have lasted'.

Some fans of Michael Keating maintain that it was Vila, and not Avon or Blake, who was the leader of the group – for example it was Vila who found Blake and helped him collect the others, and when even Avon was stumped for a way out of a situation it was always Vila who came up with something – for example in 'Ultraworld', in 'Terminal', in 'Rescue' and in escaping from Scorpio in 'Blake'.

When I told Michael of this theory his jaw dropped for a moment, he thought for a bit, then said it wasn't true. But then his smile made me wonder and he *was* the only person to appear in every episode . . . *

BUILD YOUR OWN ALIEN

BRIAN TUTTY SHOWS HOW HE EVOLVED 'TRIPODICUS', A TRULY FANTASTIC CREATURE, AND GIVES LOTS OF MODELLING HINTS AND TIPS.

The Beast: Just imagine seeing it hobbling along like a person on crutches, with its two heads so alert and picking up the slightest sound, ready to scurry back into the undergrowth on some distant planet. This was the mental picture I saw when I studied the painting by Peter Jones in his book *Solar Wind.* As soon as I picked up the book I just knew I *had* to make that creature.

The drawing: The first thing to do was to draw Tripodicus to the size I wanted. It was 290 mm high, and 440 mm long. Once I was satisfied with the drawing it was inked in. If you are not so good at drawing, you can always make a grid on the picture and scale it up or down to suit your purpose.

The armature: This can be tackled in a number of ways. First you have to ask yourself what you want your creature to do (to be a static model which has no moving parts, or a stop-motion model with fully movable parts). Static models are the easiest to make and stop motion models you should only contemplate if you want to animate them on film, but our concern here is with static models. Now we have decided what type of armature we want, what do we use? Again, you have a number of choices depending on the size. If, for instance, you are making a 1/32nd scale creature you could use fine wire as an armature and **Plasticine** as your sculpting medium. For anything above three inches I use clay. If you use a fibre-reinforced clay it goes hard overnight, does not have to be fired, and gives you a fairly hard surface when it is dry. On a large scale a Plasticine model would soon be damaged. Clay such as **New Clay** and **Das** are cheaper and therefore more economical to use.

For the armature I used sculpting wire or armature wire. This is a square bar of very soft metal which can be bent into shape by hand very easily. For the hands and feet I used very fine wire.

Before you start to make the armature you have to decide how it is going to stand up and stay up. A base is needed for this. When you make the feet, incorporate two bolts onto the armature and wind the wire around the bolts until they feel secure. Make sure that the total length of the bolt is less than the thickness of the base. Position the legs on the base and mark where the centres of the bolts come. Now drill the holes in the base the thickness of the bolt. Turn the base upside down and drill, half way through, the thickness of the nut. See **Fig 1.**

Another method is to simply nail the armature to the base. However, the bolt method is superior because when it is finished you can, if you so wish, take the model off the base. It is also more secure; after all, you do not want to spend all that time making a model only to have it fall off its base and smash into pieces.

Going back to the drawing, you can use this to get the sizes of the limbs, thinking of the armature as the skeleton of your creature.

Brian Tutty's Tripodicus strides cautiously through the undergrowth of its curious world. Visitors to next year's Model Engineer Exhibition at Wembley will be able to study this model which forms part of a large SF/Space section. Photo: Author.

Once you have made all the arms and legs, you put them together. This can be done by winding fine wire around the pieces being joined. If you want to strengthen them further, cover the joints with epoxy resin.

Plaster of Paris: Now comes the messy bit. As the creature is quite large I used Plaster of Paris to pad out the armature. This helps to strengthen it and it also saves on the clay. Wind the bandage around the armature until you get to the required thickness. Make sure you do not put too much on, or you will end up with a *fat* creature!

The body: For this I used a rolled up ball of paper. I covered it and I now had something which was taking shape, but I did not cover the feet as they were too thin. The Plaster of Paris dries in about 30 minutes.

The sculpting: I was now ready to apply the clay. I started with a head, there was no reason for this apart from wanting to get the best part finished first! I then covered the body. There is not a lot I can say about sculpting; it is one of those subjects that you can show people how to do, but it is very difficult to put into words. The only tools I used were my fingers, a small paint brush and a spatula. That is basically all you need.

The neck and head: In the painting the limbs looked similar to a snake's body with a cobra's neck and a duck's bill. The neck and legs were sectioned as though they could bend in any direction or coil around his prey.

I tried to keep the concept of the snake when sculpting the neck by starting off thick at the body and thinning out at the head. The limbs were then smoothed down and made into sections. I then began the other head which was made slightly differently to give it character.

The legs: These were made in the same manner as the neck except that as they went into the wrist I applied scales, starting off with large ones, and getting smaller towards the hand.

The hands and feet: The way the front limbs curled up I imagined them to be hands, and the other two limbs to be 'feet'. A lot of time should be spent on the hands and feet as they are the most detailed part of the model besides the heads.

The claws: These presented a nice problem. I used rose thorns, and these can be used for teeth as well. If your model is going to be too big for this idea you can carve some out of Beech or any hardwood.

I embedded the rose thorns in the clay and made the fingertips and knuckles. I now had the basic finished model which was left for 24 hours to dry.

The next day when I looked at the model I noticed large cracks had appeared; do not be too worried about this, just fill them up and then cover the model with a diluted solution of PVA wood glue (two parts water, one part glue). This, when dry, makes the model shiny and gives it a smooth finish. It also protects the clay. Use two or three thin coats instead of one thick one. Only apply the next coat when the first one is dry.

The fur: There is a knack to making fur look realistic; always make the fur go in the same direction. The fur should always go towards the back of the model, otherwise your creature will resemble a punk rocker who has just got out of bed!

PVA was used to glue the fur. Cut the fur into small strips and always start from the bottom and work up. This hides the joint between the fur.

The feelers: Once all the fur was applied, all that remained was the small feelers on the head which were made of wire. A small hole was drilled in the head and they were glued on. Now the model was ready for painting.

The painting: All the painting was done with an airbrush, a **Badger 200** to be exact. I prefer this because you can blend the colours into each other and get some excellent results.

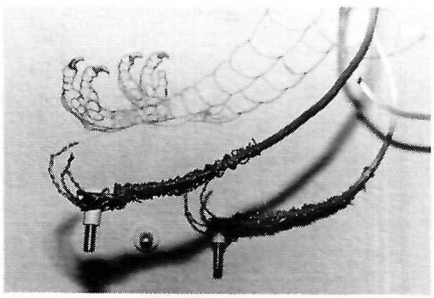
The first coat was glossy white which made the fur go a mushy grey. One tip when airbrushing fur is to make sure you apply very fine coats. I sprayed about four coats before it looked dense enough. If you spray a heavy coat it tends to mat together and looks terrible.

I then painted the rest of the body bright pink, at which stage it looked horrible. The fur was given its final coat, yellow with a red stripe, which covered the back of its body and came into a point at the front.

To imitate the scales I used a piece of gauze and sprayed through it. This made a series of dots and, using this method, I sprayed the whole model. I used about seven different colours, lighter on the top and darker at the bottom. The bill was sprayed bright orange and the blue stripes added. The eyes were grey with two white highlights painted on to give them life. A mapping pen was used to ring the eyes which made them stand out. *

Next issue!
Building the spaceship *Luna* from 'Destination Moon'.

KEY TO CONSTRUCTION PHOTOS. 1. The two bolts for the legs bound to the armatures with wire; 2. All three legs and bolts, the latter originally used to hold kitchen cabinets together! 3. The completed armature; note the author's working drawing in the background; 4. The body is made of rolled up paper covered with Plaster of Paris; 5. Everything covered bar the feet which are too thin. 6. Sculpting the head was the most enjoyable part of the exercise; 7. The working and shaping continues and the legs are left until last. 8, 9 and 10; After the sculpting was complete, the model was left for 24 hours to dry; 11. Adding the fur which will be airbrushed later. Photos: Author



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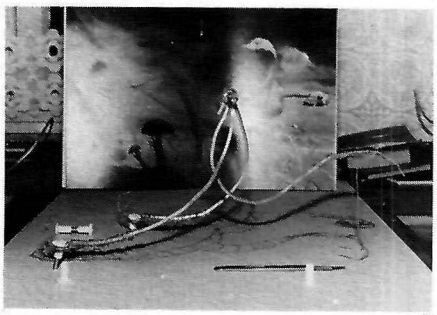

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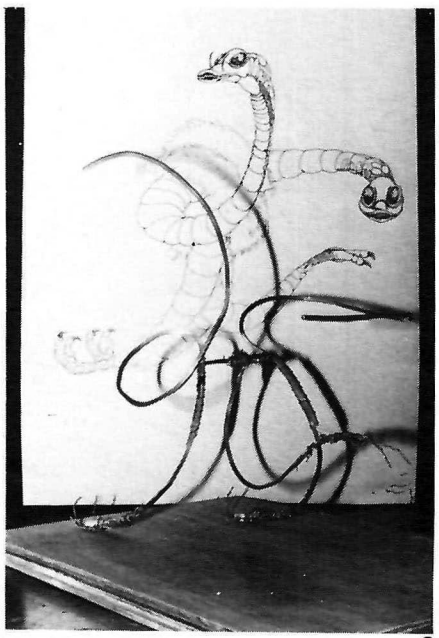

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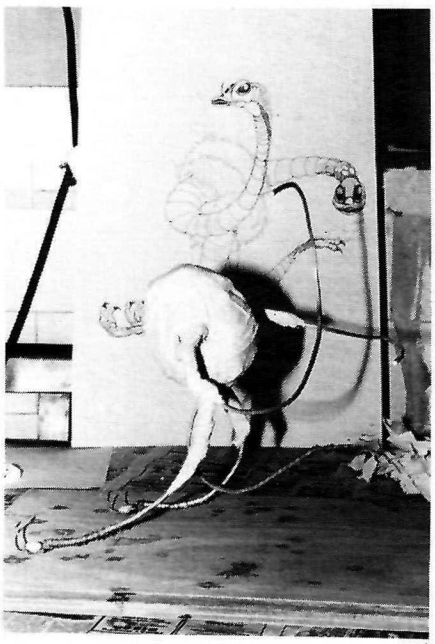

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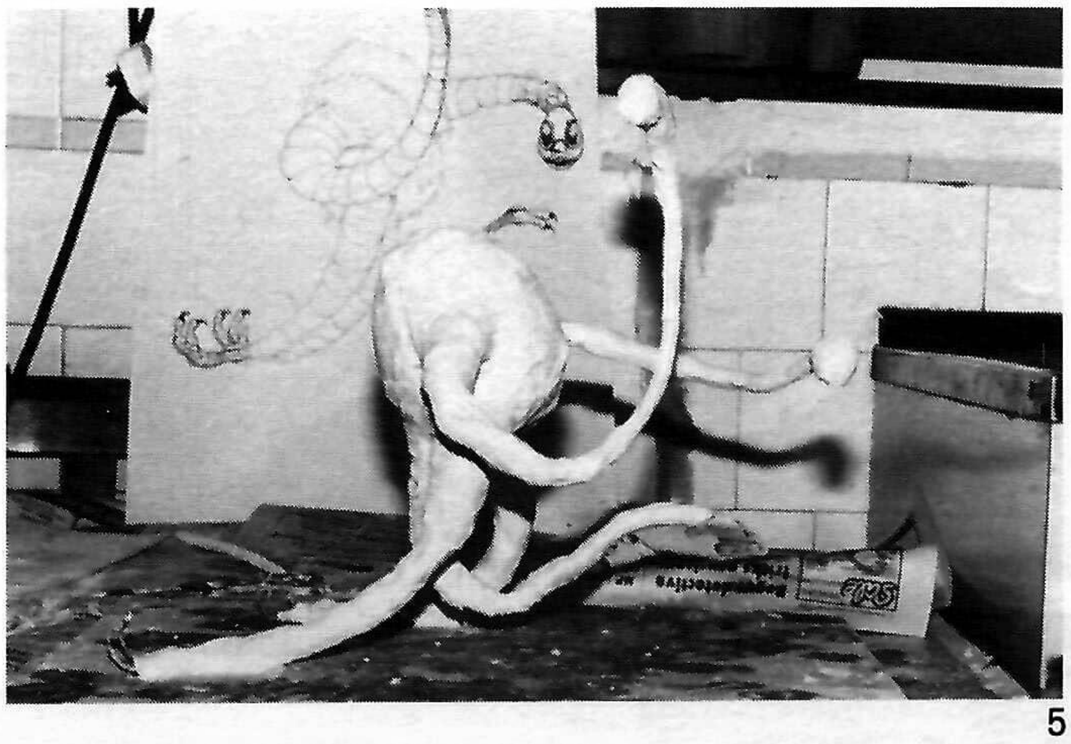

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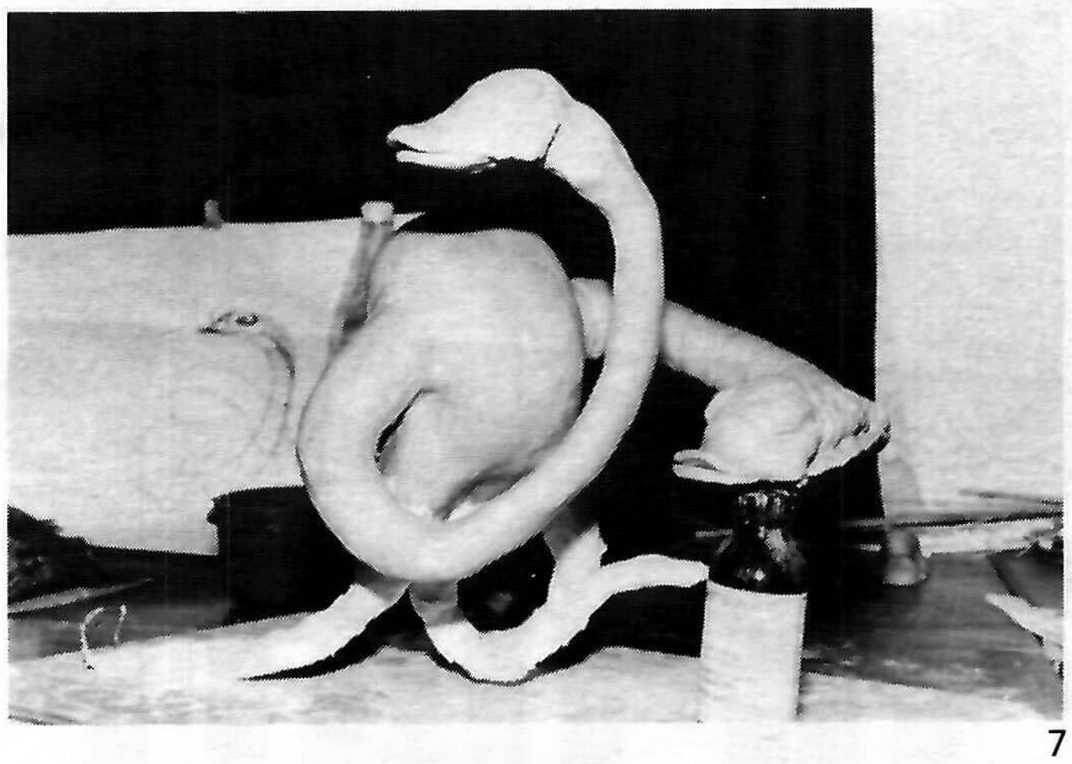

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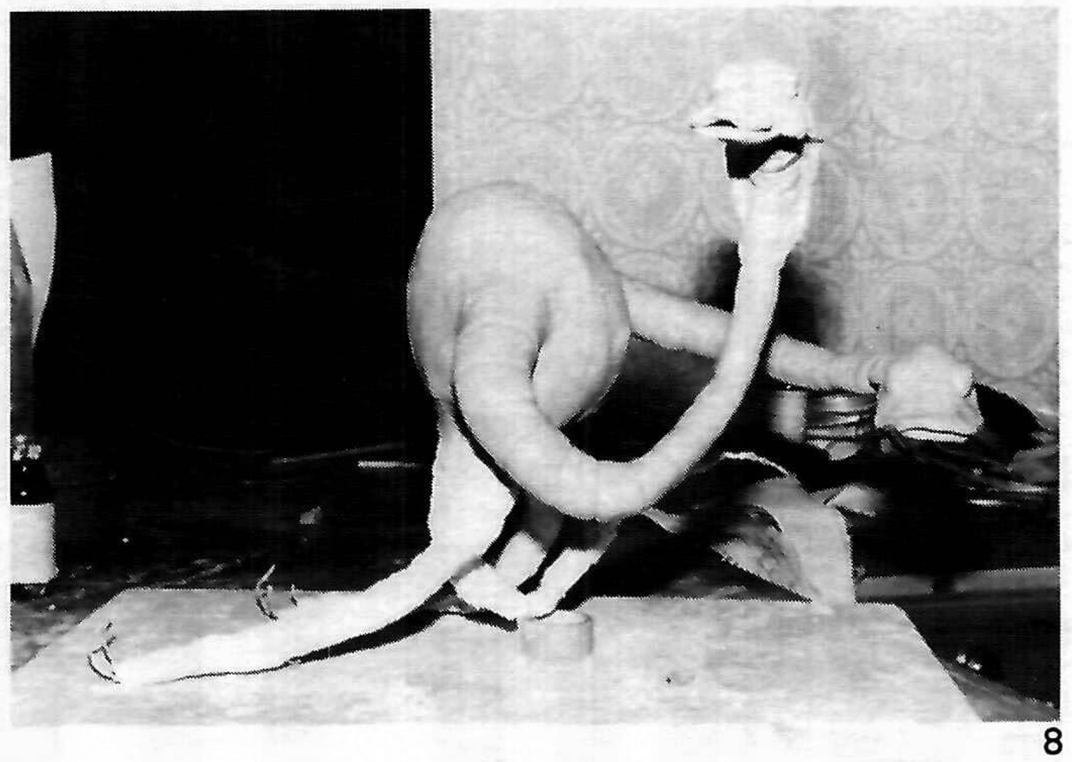

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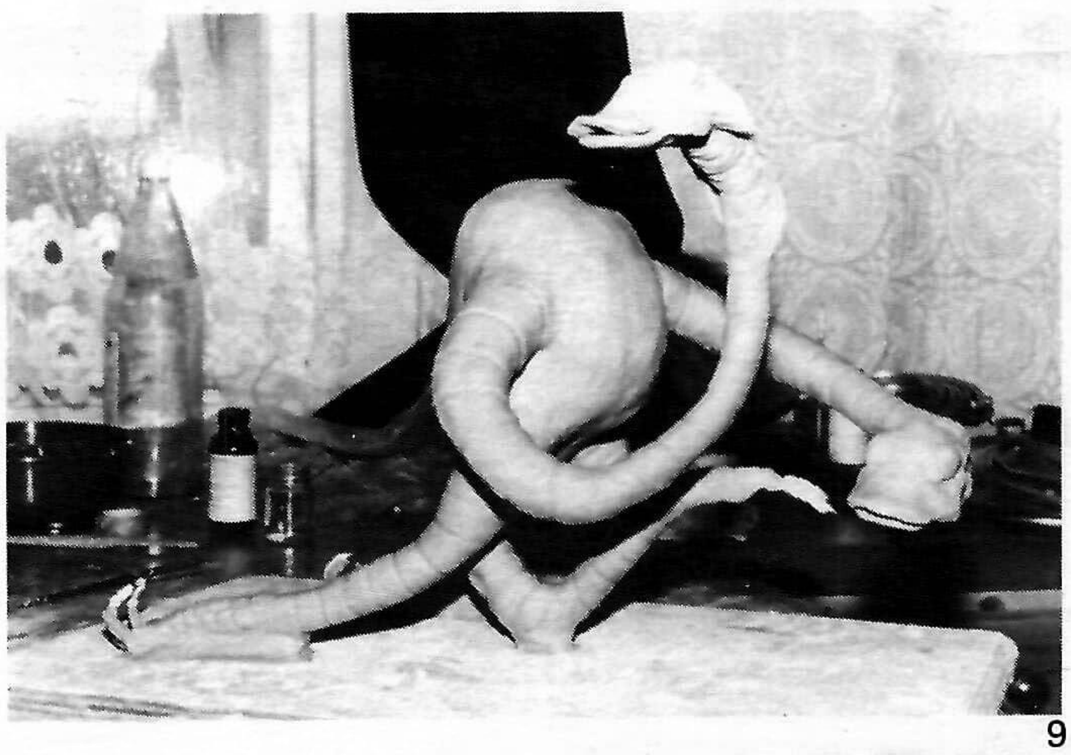

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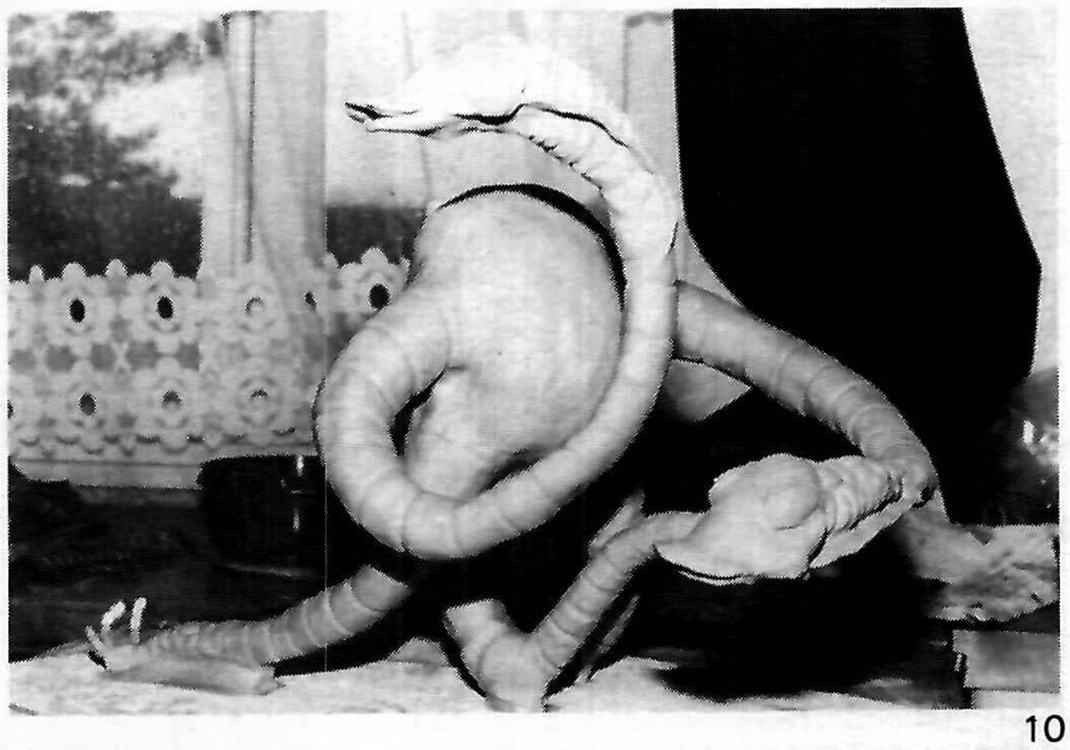

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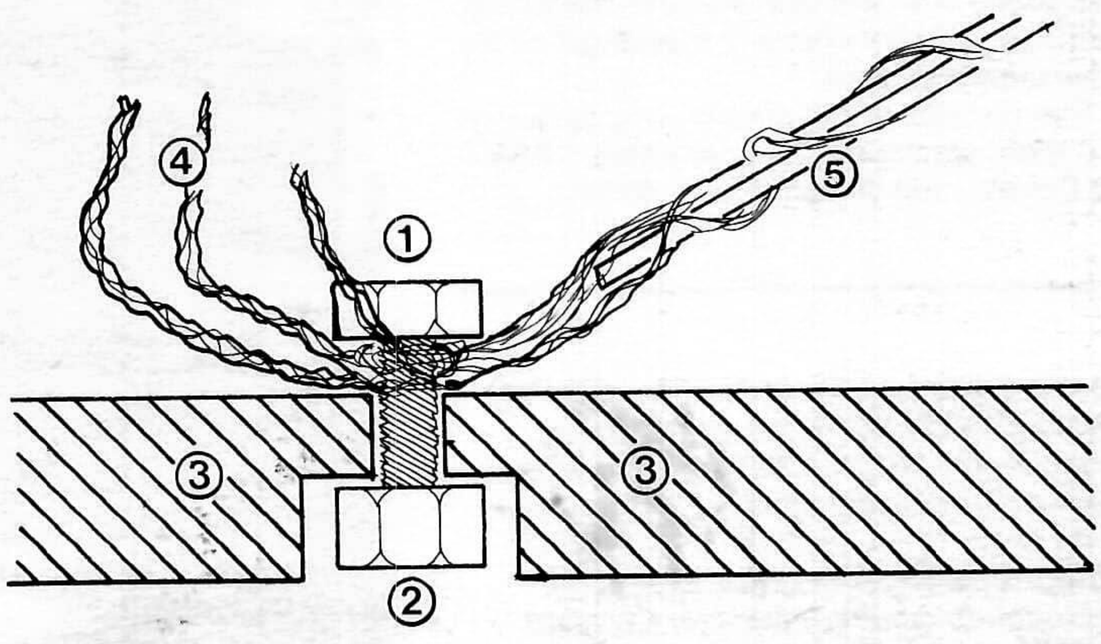
Figure 1

1. Bolt.
2. Nut.
3. Base.
4. Wire.
5. Armature wire.

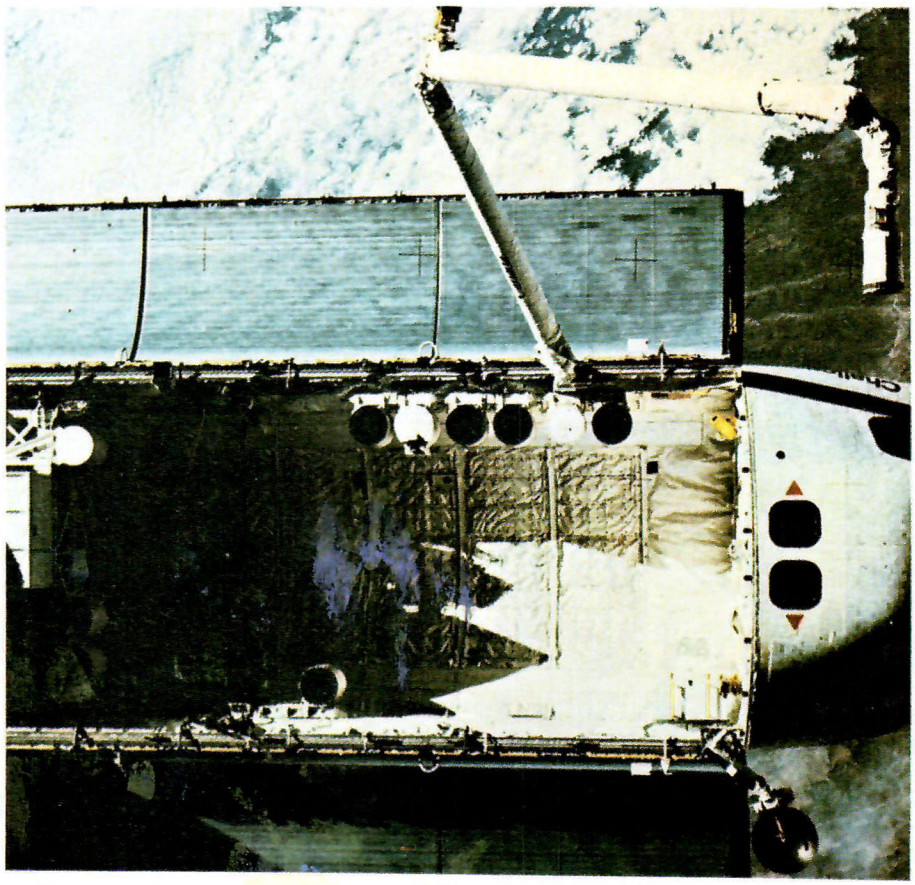


SHUTTLE UPDATE

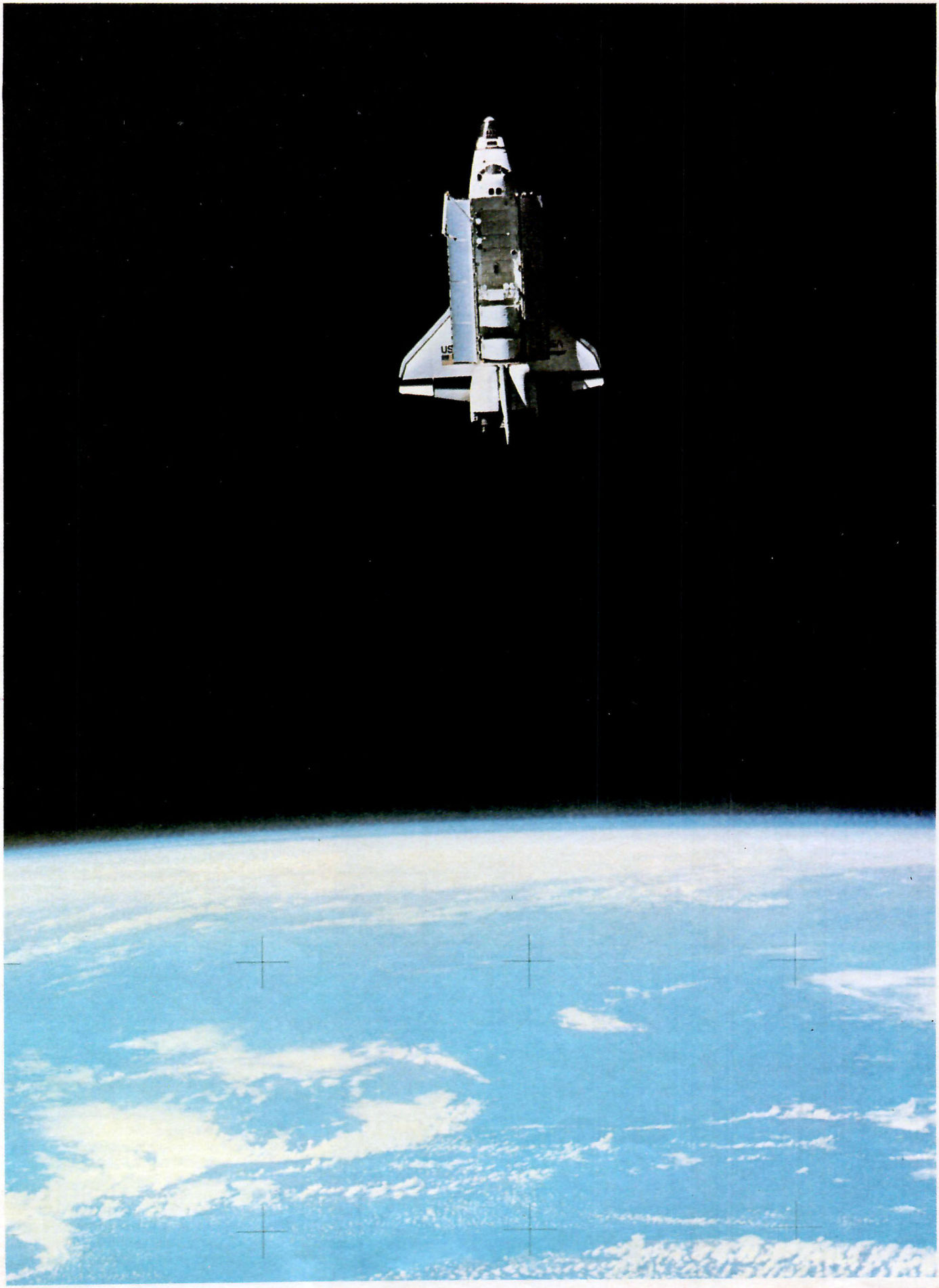
MAT IRVINE BRINGS US UP TO DATE WITH ALL THE LATEST DEVELOPMENTS.

The seventh flight of the Space Transportation System lifted off on June 18 and went through an almost perfect six day mission. Five crew were aboard the second flight of the Orbiter *Challenger,* with the commander, Robert Crippen, setting a first as it was the second time he had flown aboard the Shuttle. (He was the pilot on the first mission (STS-1) in April, 1981.) Pilot for STS-7 was Frederick Hauck, a captain in the US Navy, and mission specialists John Fabian and Sally Ride. A fifth mission specialist, Dr Norman Thagard, was added at a relatively late date (December 1982) to study the effects of spaceflight on the other crew-members.

The purpose of the mission was to launch two more communications satellites – Anik C for Canada, and Palapa B for Indonesia. Both



Above, the 'Enterprise' at Stanstead – a memorable day for UK space enthusiasts. Photo: Author. ***Right, 'Challenger' from the German SPAS pallet Satellite, 157 nautical miles above Earth. Opposite page, a superb view of 'Challenger' in space. Each of the photographs required computer keyboard entries, converted into commands.***



were boosted by the McDonnell Douglas Payload Assist Module into the much higher geostationary orbit.

Also on board for the first time was the German-built SPAS – Shuttle Pallet Satellite, a retrievable platform that can be used inside or out of the cargo bay. It was from the SPAS that some of the most spectacular photographs of any Shuttle mission were obtained, for floating free above the Orbiter, TV and still cameras aboard the SPAS could picture the craft as it has never been seen before.

Manoeuvring of the SPAS was done by the Remote Manipulator System and the first release, performed by John Fabian, lasted 60 seconds before the payload was recaptured. Having established that the systems were working correctly, and although the SPAS appeared to be approaching the maximum permitted temperature (102°C), it was released and Robert Crippen began manoeuvring *Challenger* away. Maximum separation was around the 1000 feet mark, and with the SPAS in free-flight condition, experiments aboard, such as a German material processing experiment, could take place without any perturbations from the Orbiter.

While the SPAS was free-flying, Sally Ride and John Fabian went through a series of moves with the manipulator arm as if attached to a 15 x 60 feet payload; *ie,* the Space Telescope, which it will need to manoeuvre in 1986.

After several hours, Bob Crippen began positioning *Challenger* nearer to the SPAS and, with a combination of Crippen flying the Orbiter, Sally Ride in control of the SPAS, and John Fabian using the manipulator arm, the pallet was successfully retrieved while the craft were flying over Ascension Island.

Bob Crippen was particularly pleased with the whole experiment for he is due to command the STS-13 flight in April, 1984, which will rendezvous with the malfunctioning Solar Maximum Satellite that hasn't worked since it was launched.

Later in the mission, more experiments were performed with the SPAS, with both Sally Ride and Norman Thagard operating the arm. These tests were designed to put the manipulator arm through a thorough workout, rather than the SPAS, by using back-up systems which bypassed the main Orbiter computers. In all cases the arm performed perfectly, and added to the confidence needed for the Solar Maximum Satellite mission. The SPAS suffered a slight malfunction itself during the mission, refusing to accept some of the commands, but overall the experiments were performed without a hitch.

Challenger was due to land back at her launch site on a specially-built runway at Kennedy Space Center, but slight problems with two out of the three Auxiliary Power Units, coupled with adverse weather conditions at the Cape, prevented this. The APUs power all the hydraulics of the craft and the system allows for one to be suspect, but not two. With only one APU malfunctioning, *Challenger* could have remained in orbit for a further day to see if the Kennedy weather conditions improved, but with the second APU becoming suspect, the back-up facility of using the original Edwards Air Force base landing site was chosen. Landing was on Runway 15, which gave the opportunity to check crosswind performance, and was perfect apart from damage to one of the main-wheel brakes. Bits of this brake were found scattered all over the lakebed, but there was no real danger to the Orbiter herself.

After an extremely rapid turn-around, *Challenger* is being readied for her third launch, probably August 13 (at the time of writing). This would be the fastest yet, six days less than the 34 days necessary for STS-7.

The Orbiter, modified with an enclosed cargo compartment at the aft end of the large external tank, is one of two Shuttle-derived concepts to receive future consideration for the National Aeronautics and Space Administration. Photo: Martin Marietta.

STS-8

This will be the first night-launch of a Shuttle mission, and a night landing is also planned for STS-8 which was originally planned to carry the second Tracking and Data Relay Satellite into orbit, but problems that occurred with the Interim Upper Stage and the first TDRSS have caused this to be cancelled. The gap left in the payload bay has been partially filled with the Payload Deployment and Retrieval System Test Article, which has been moved forward from STS-11. It is basically a large mass structure, 15 x 16 feet and weighing around 8500 lb. Its task is to test the manipulator arm with a large mass that it will eventually have to deal with, such as the Space Telescope, and in particular will test the elbow, wrist and shoulder joints of the arm.

Unaffected by these changes is the Indian National Satellite (INSAT-1) which is still due to be deployed in a similar manner to the payloads of the last mission. A PAM-D will boost the satellite into geostationary orbit.

The crew will be commanded by Dick Truly, with pilot Dan Brandenstein, and mission specialists Dale Gardner and Guion Bluford. As with STS-7, a medical doctor has been added to the specialists, William Thornton.

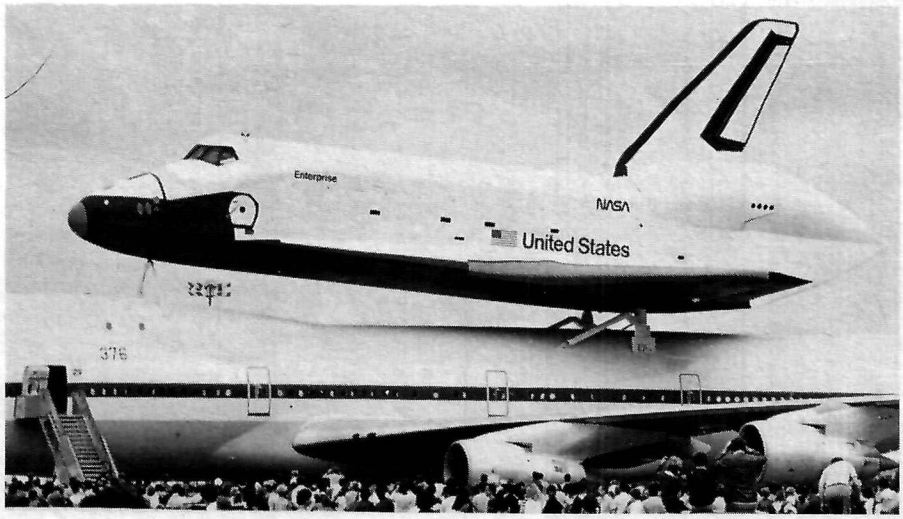
STS-9

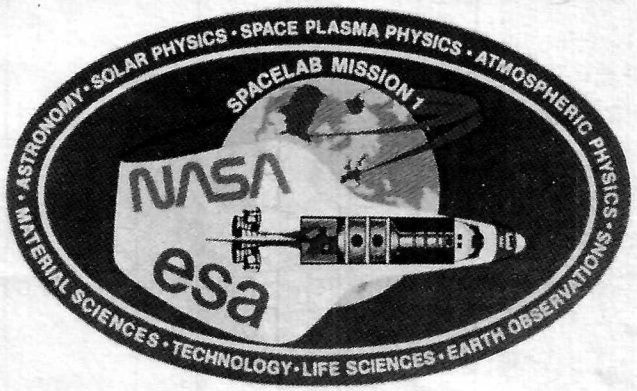
Following STS-8, in late October will come the most complex Shuttle flight to date and probably the most important – STS-9 and Spacelab 1. More than 70 scientific investigations are due to be performed over the mission covering astronomy, solar physics, space plasma physics, atmospheric physics, Earth observations, life sciences, technology and material sciences. All of which are listed around the mission badge, along with the fact that this is a joint American-European venture. Commanding the flight will be veteran John Young, who, besides commanding STS-1, flew on Geminis 3 and 10 and Apollos 10 and 16. Pilot will be Brewster Shaw, making his first flight. The mission specialists are Skylab astronauts, Dr Owen Garriott and Dr Robert Parker. Payloads specialists are Dr Byron Lichtenberg, a biomedical engineer and a physicist from West Germany, and the first non-American to fly on a US flight, Dr Ulf

Merbold. This will also be the first six man crew to be flown.

One experiment that will be of particular interest to amateur radio enthusiasts is that Owen Garriott, himself a 'ham', will be using a hand-held set during the mission. Garriott's call sign is W5LFL and it is hoped that transmissions will occur during his rest periods for up to an hour at a time. Transmission will be in the range 145.51 MHz to 45.770 MHz and reception in the range 144.910 MHz to 145.470 MHz, FM. The set will be operated from the aft flight deck of *Columbia,* with an output of five watts. The antenna will be fixed to the upper crew compartment window.

Dr Garriott is quoted as saying, 'Amateur radio is a valuable, national, even international, asset and it is certainly appropriate that Spacelab be used to demonstrate this capability. I look forward with great enthusiasm to brief conversations with as many of my fellow hams around the world as our work schedule will permit.'




ASTRONOMY · SOLAR PHYSICS · SPACE PLASMA PHYSICS · ATMOSPHERIC PHYSICS
SPACELAB MISSION 1
NASA
esa
MATERIAL SCIENCES · TECHNOLOGY · LIFE SCIENCES · EARTH OBSERVATIONS

Above, the 'Enterprise' at Stanstead. Photo: Mat Irvine. *Right, the Spacelab One mission badge showing the points of origin of the Shuttle (USA) and Spacelab (Europe). The border names the areas of scientific investigation of the flight.*

MoD specialist for Shuttle

To date, Britain – as usual – lags behind in manned spaceflight. However, NASA has offered the Ministry of Defence a position for a payload specialist in 1985 during the flight that could launch the new series of British military communications satellites, Skynet 4. This is at last British-built (by BAe) the earlier Skynets being built in the States. All it would cost is $150 000, which is fairly insignificant when compared with the overall cost of the $13 M launch fee. Let us hope that should the Skynet 4 launch be confirmed by Shuttle, this offer is taken up.

The future of the Shuttle

The Space Shuttle in its present form has already proved to be a highly adaptable piece of equipment, but overall the shuttle system as we know it is somewhat of a compromise. Glance back to any '50s and '60s illustrations for 'shuttles' and the one very obvious point about them is that they are intended to be entirely recoverable. Both the orbiter and boosters are manned, winged and designed to fly back. The Rockwell International design that became what we call 'the Shuttle' was a hybrid design. Not enough funding was available to allow for both sections to be manned and fully recoverable. The orbiter section obviously had to be manned, but the booster section became the now-familiar compromise of solid fuelled boosters and giant external tank to supply fuel to the engines of the orbiter.

The Space Transportation System, as good as it is, is limited, but the potential is there. Plans are already in preparation to use, adapt and modify the various shuttle components in ways never initially thought of, but which allow the STS system as a whole far greater flexibility.

Some measures have been taken already. The External Tank is no longer painted, which saves a small, but significant, amount of weight. The SSMEs – Space Shuttle Main Engines – are running above their intended 100% efficiency, up to 104% and even 109%. Modifications to the Solid Fuelled Rocket Boosters will allow reduction in their overall weight, and an increase in power.

One way to immediately give a boost to the Boosters(!) would be to add strap-on solid-fuel rockets to the SRBs. This is accepted practice with such rockets as the Delta Series and will also be used for Ariane.

An add-on container to the aft end of the External Tank would give double the space of the Orbiter payload bay. This ACC – Aft Cargo Carrier – could take loads up to 25 feet in diameter, as against the payload bay's 15 feet. It could carry extra Spacelab modules, electrical power generators, large space structures and probably, what could be the most important, an Orbital Transfer Vehicle. The last is a design for a small 'tug' that could be used to manoeuvre around the Shuttle and associated structures and also travel from the low Shuttle orbit up to the much higher, geostationary orbit.

Using an ACC would necessitate the ET travelling into orbit with the Orbiter, but as was pointed out in an earlier article (*Winter* '82, pages 8 and 9) this is already in the planning stage. The Remote Manipulator Arm would be used to retrieve the payload from the ACC, lifting it over the aft end of the Orbiter.

Taking things one stage further, there is no reason why the Orbiter cannot be deleted from the Shuttle set-up, and the other components used in other combinations.

One idea being studied by the Marshall Spaceflight Center just uses the SRBs, three of them in a design termed SRB-X. Two standard SRBs carry a third into space, which itself then fires and carries a payload of around 60 000 (nearly 27 tons) into orbit. Such a system would be relatively cheap and quick to assemble.

More ambitious is a design to mount the payload on top of a shortened External Tank, with a single SSME mounted beneath it. Two or four slightly shortened SRBs would then be attached. With four of the SRBs attached this rocket could lift 200 000 lb (which is nearly 90 tons) into Earth orbit, equal to the now obsolete Saturn 5.

A similar approach, though using a side-mounted payload module instead of the Orbiter, could lift larger loads. The standard complement of three SSMEs would be mounted, with the two OMS engines, in a recoverable pod, similar to the aft section of the Orbiter. The payload section would match that of a third stage liquid-fuelled rocket, such as the Centaur. This would be able to carry an extremely heavy payload into orbit. Two standard SRBs attached to this Heavy Lift Launch Vehicle would be able to orbit 150 000 lb and, with four attached, even more.

However, the biggest increase in power that the Shuttle system could hope for is if the Solid Fuelled Boosters were replaced with liquid fuelled rockets. These would be larger than their solid counterparts, 20 feet in diameter, instead of 12, and 156 feet long, compared with 149. Liquid hydrogen and liquid oxygen would power four Space Shuttle Main Engines for each booster with clam-shell doors to protect the engines during recovery and splashdown. The LRBs could replace the SRBs in any of the aforementioned systems, and four such boosters attached to the Heavy Lift Launch Vehicle assembly would be able to orbit 335 000 lb, or nearly 150 tons!

Continued on page 70

"You're travelling
through another dimension.
A dimension,
not only of sight and sound,
but of mind.
A journey
into a wondrous land
whose boundaries
are that of imagination–
Next stop,
the Twilight Zone!"

–Rod Serling

TWILIGHT ZONE THE MOVIE

RANDY AND JEAN-MARC LOFFICIER TALK TO JOE DANTE, DIRECTOR OF THE LATEST SF/FANTASY FILM DOING THE ROUNDS.

Although Rod Serling is little known in Europe, if one were to stop people in the street in the United States and ask them about science fiction, chances are that his would be one of the first names mentioned.

For four years (from 1959 to 1963) Serling introduced the genre to the American public in a television series called *The Twilight Zone*. During that time, he almost became a legend and today, eight years after his death, his face is still seen regularly on the thousands of *The Twilight Zone* re-runs around the USA.

An Angry Young Man

Few persons have done more to popularise SF, in the cinema or on the small screen, than Rod Serling. He was the son of a butcher of Binghamton, a small town located in New York State. As a child, Serling was fascinated by drama and sports (perhaps because of his reduced stature of 1.64 m) and later almost became a boxer. During World War II, he won the Purple Heart medal due to his bravery as a paratrooper.

The atrocities of war, and Serling's own injuries, might have awoken in him a desire to write and unburden his soul, for soon afterwards he began to send dramatic stories to local radio stations, and then to a new, burgeoning market: that of television.

Serling's first big break came in 1955 with *Patterns*, an intense tale of corporate intrigue, which won him the first of his six Emmys. The following year, Serling won another Emmy for *Requiem for a Heavyweight*, the tragic story of a fighter on the decline. Then came *The Comedian* in 1957, which won him a third Emmy.

Serling had, in the space of a few years, become one of the major writers in the industry. He had discovered, however, that the business carried many frustrations. Producers wanted to change his scripts. Sponsors became wary of controversial ideas, or simply asked for changes for silly commercial con-

siderations. (A gas company sponsoring a show reportedly asked that no mention be made of gas chambers in a World War II story).

A refuge from these aggravations appeared to be the world of fantasy, probably because it was perceived as being unconnected with reality. It was therefore left relatively untouched by the networks' meddling hands. Serling had had more than a passing acquaintance with SF, having previously written an unadapted screenplay based on John Christopher's *No Blade of Grass*, and a semi-SF story, *Forbidden Area* for *Playhouse 90*.

As a consequence, in 1957 Serling wrote an ingenious time-paradox story, *The Time Element*, telling of a man who had 'seen' the Pearl Harbor attack before it happened, but was unable to convince the authorities of the reality of his vision. This story was intended to be the pilot for a new fantasy series called *The Twilight Zone*.

A Star is Born

Although **CBS** indeed liked and bought *The Time Element*, they did not give Serling a green light for his series. The incredible success of *The Time Element* in *Desilu Playhouse* the following year, however, made them reconsider. Serling was then asked to come up with another, shorter story.

This was *Where is Everybody?*, the first *Twilight Zone* episode. It shows the plight of a man, alone in a mysterious town. The final, brilliant twist reveals that he is in reality an astronaut undergoing isolation tests (although the town might actually have existed, since in his pocket he finds a theatre ticket stub which he had picked up!) Both CBS and **General Foods** liked the story, and *The Twilight Zone* was officially launched on March 8, 1959, with the first episode broadcast in October of the same year. . .

'There is a fifth dimension beyond what is known to Man. It is a dimension as vast as space and timeless as infinity. It is the middle ground between light and shadow, between science and superstition, and it lies between the pit of man's fears and the summit of his knowledge. This is the dimension of imagination. It is an area which we call . . . the Twilight Zone!'

The detailed story of *The Twilight Zone* has been told enough[1] times for it to need re-telling here. By far and large a critical success, the series never garnered the number of viewers that CBS would have liked. Sponsors came and went. Yet, the programme was allowed to continue relatively 'unmolested' for three seasons, until 1962, at which time CBS attempted to replace it with a situation comedy called *Fair Exchange*.

The show gained a reprieve in 1963, and was even extended to one-hour length. But this came too late. Producer Buck Houghton, who had contributed to shape the series since its early days, had left and was replaced by Herbert Hirschman and Bert Granet.

The one-hour format was not deemed successful enough, and *Twilight Zone* was back for a fifth, and last, series of half-hour episodes. By then, even Serling had grown tired, and the programme was ultimately cancelled at the end of January, 1964.

During its four plus years of existence, *The Twilight Zone* had truly been a 'star' in the firmament of television. It had had some of the best directors: Douglas Heyes, Buzz Kulik, Montgomery Pittman, Lamont Johnson; some of the best writers: Charles Beaumont, Richard Matheson, George Clayton Johnson; and even some of the most famous actors in Hollywood: Buster Keaton, Mickey Rooney, Carol Burnett, Donald Pleasance, Cliff Robertson, Ida Lupino, Robert Redford, Lee Marvin, James Coburn, Burgess Meredith, Agnes Moorehead, etc . . .

At the same time, *The Twilight Zone* had virtually brought to the screen a literary genre. In the tradition of Poe, Bierce, Henry and others, every week *The Twilight Zone* presented a story where the fantasy or surreal elements never overpowered the human interest and the well-rounded characters.

The critical success of the series can probably be attributed to that fact. In the minds of most viewers, SF at the time evoked pubescent fantasies of over-endowed ladies being chased by atomic monsters. The ever-present human interest and undeniable qualities of Serling's programme undoubtedly helped fantasy to come in through the backdoor and gain a foothold in American living-rooms.

Night Gallery and Others

After *The Twilight Zone*, Serling kept writing screenplays for both television and the movies. Among his most famous accomplishments are adaptations of Irving Wallace's *The Man*, and of Pierre Boulle's *Planet of the Apes*. The twist ending where the sight of a half-buried Statue of Liberty reveals to Charlton Heston that he has not really left Earth must, in particular, be attributed to Serling.

Serling had also written the screenplay for John Frankenheimer's *Seven Days in May*, perhaps the most frightening story ever made about the dangers of a military coup in the United States. In 1966, he was responsible for a TV-movie, *The Doomsday Flight*. This story of a terrorist who plants a pressure-sensitive bomb on an airliner, sparked many copycat hoaxes and, unfortunately, prompted Serling to apologise publicly.

In 1969, **Universal** and **NBC** got Serling to put his name on a new anthology series, called *Rod Serling's Night Gallery*. Among the directors of the first three-part segment was Steven Spielberg who, two years later, achieved fame with a Richard Matheson, *Twilight Zone*-like, script, *Duel*.

Despite some good stories (which won Serling two more Emmys), some competent directors, such as Jeannot Szwarc, and actors such as Zsa Zsa Gabor, Vincent Price, Edward G Robinson, Elsa Lanchester, Yaphet Kotto, etc, *Night Gallery* was too exploitative to truly please Serling. Furthermore, the author found, much to his dismay, that he was contractually prevented from removing his name from the programme! In 1973, unable to compete against *Mannix*, and to Rod Serling's complete satisfaction, *Night Gallery* was cancelled.

During the early seventies, Serling lectured and taught writing. In June 1975, at the age of 50, he died during open-heart surgery.

The Twilight Zone Returns

The Twilight Zone gave birth to many imitators, some of them very good in their own style: *The Outer Limits* (screened on British TV in recent years), *Thriller*, *One Step Beyond*, etc., but it was never successfully remade, not even by Rod Serling, as the semi-failure of *Night Gallery* indicates.

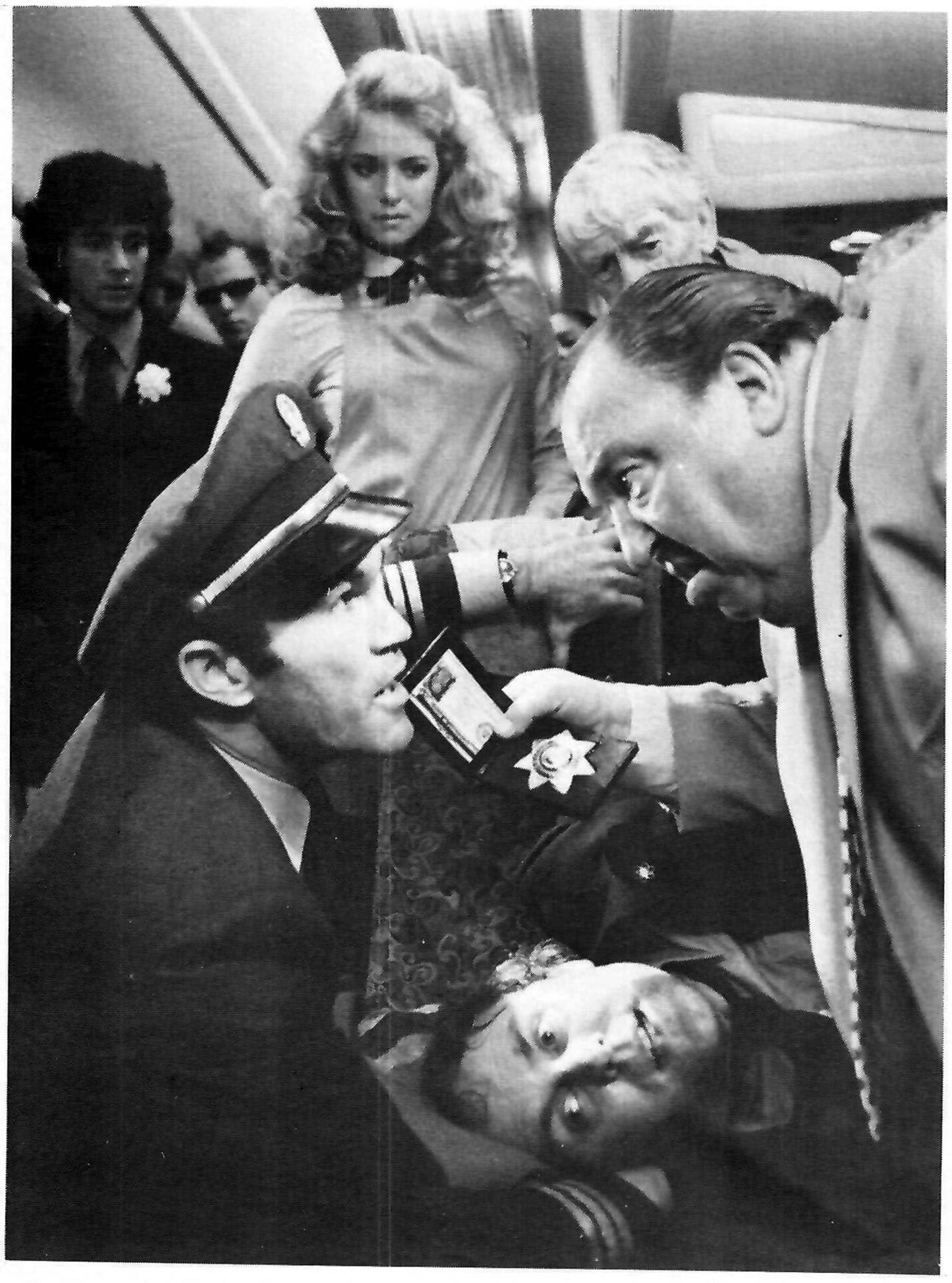
Yet, the show, if anything, has gained in popularity over the years, and has indeed achieved cult status. Rod Serling still appears daily on millions of TV sets throughout the United States and, in his unimitable tones, takes his fans for a tour in the realm of imagination.

It was therefore unavoidable that, at one point or another, **Warner Bros.** who had obtained the rights to *The Twilight Zone* from Carol Serling, would attempt to produce a remake. However, it took Steven Spielberg's indomitable energy to get the project off the ground.

The young director of *E.T.* (see *New VOYAGER* No 2) and *Close Encounters of the Third Kind* gathered around him other such gifted directors as John Landis *(American Werewolf in London)* and Joe Dante *(The Howling)*. Australian-born George Miller *(Mad Max)* was subsequently added to the picture when it was decided to do four segments. Veteran-writer Richard Matheson was signed to do the screenplay, and Jerry Goldsmith, who had scored many original *Twilight Zone* episodes, composed the music. The four segments ultimately chosen were:

1. An original story by John Landis, which nevertheless made use of a concept particularly dear to Serling's heart: the idea that if one could see through one's enemy's eyes, he would no longer be one's enemy. This was present in such World War II-inspired episodes as *A Quality of Mercy* and *The Encounter*. Here, a bigot travels through time into various wars, including Vietnam. This leads him to a better understanding of himself and his enemies.
2. A remake of *It's a Good Life*, an original episode scripted by Serling from a Jerome Bixby story. This segment is directed by Joe Dante, from a new script by Richard Matheson. The TV episode told of a small town forced to live in fake, perpetual happiness because of the fear of being destroyed by the terrifying mental powers of a child (before his death, Serling was rumoured to have been working on a movie script based on this story).
3. A remake of *Kick the Can*, an original episode written by George Clayton Johnson. This segment is directed by Steven Spielberg, from a new script by Richard Matheson. The TV episode told of how a group of old men refused to be old and, by playing a children's game, actually regained their youth.
4. A remake of *Nightmare at 20 000 feet*, an original episode written by Richard Matheson, originally directed by Richard Donner *(Superman)* and now directed by George Miller. The TV episode starred William Shatner as a recovering mental patient who kept seeing a monstrous gremlin on the wing of the aeroplane in which he is travelling.

Tragically, *The Twilight Zone: The Movie:* was almost cancelled when, on July 23, 1982, at 2:30 am, actor Vic Morrow and two Vietnamese children, died in a helicopter accident while filming the John Landis segment. The fatal accident occurred on the last day of shooting. Morrow was to run away from a burning Vietnamese village, carrying two small children with him. At the same time, special effects explosions were slated to go off. The scene was being shot from a camera helicopter, which reportedly went out of control 20



feet off the ground and crashed, killing the three actors and injuring six crew members.

Later, investigations by the National Transportation Safety Board showed that the tail section of the helicopter had been engulfed by fireballs caused by the explosions, and that the back rotor had been hit by a piece of metal identified as the lid of an explosive can.

The California branch of the Occupational Safety and Health Administration also fined the production company for violating child labour laws (children cannot work at night) and exposing minors to 'extremely hazardous situations.'

Various lawsuits were filed, including some by the victims' families, and several investigations regarding the reason for the helicopter's low altitude, and the force of the explosions, are still under way as we write.

In a recent interview granted to the *Los Angeles Times,* Steven Spielberg, for the first time since the accident, made his feelings known. 'The accident cast a pall on all 150 people who worked on the production. We are still just sick to the centre of our souls. I don't know anybody who hasn't been affected. A movie is a fantasy – it's light and shadow flickering on a screen. No movie is worth dying for.'

Despite this host of troubles piled upon the film and its principals, *The Twilight Zone: The Movie* continued although its US release was postponed from Christmas, 1982, to the Summer of 1983. It is, however, likely that the outcome of the numerous lawsuits and investigations will take much longer.

An Interview with Joe Dante, director.

The Burbank Studios are home not only for **Columbia Pictures** and **Warner Bros,** but also for a variety of independent production companies, such as Steven Spielberg's **Amblin Productions.**

It is in one of the faded pink-beige buildings at TBS that Joe Dante has his office. On the walls are memorabilia from various films, including a French poster of *The Howling (Hurlements),* and a sketch of one of Rob Bottin's creations for *The Twilight Zone*. Dante sits at a desk that is covered in papers, books and odds-and-ends.

It doesn't seem possible to have a conversation with the young director without his wry sense of humour surfacing in every other sentence. It is perhaps for this reason that none of his films have been without their own relfection of his light-heartedness.

Dante started as a trailer editor for Roger Corman's **New World Pictures.** In the course of his work, he and his friends, Jon Davison (Producer of *Airplane!)* and Allan Arkush, managed to persuade Corman to let them try their hand at film-making.

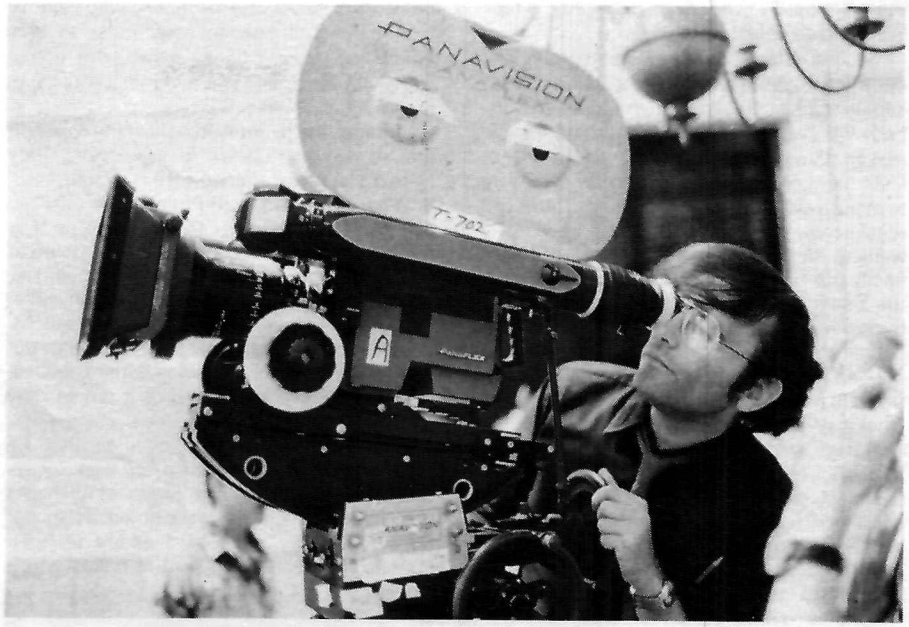
The result was *Hollywood Boulevard,* a mixed-bag comedy which has become something of a cult classic. After that, Dante went on to do *Piranha,* which became one of New World's most profitable films.

Piranha brought Dante in contact with

Top, the late Vic Morrow (centre) is unexpectedly interrogated by Nazis on a Paris street in a segment about a man who must face the consequences of his own bigotry. Left, John Lithgow portrays an airline passenger terrified beyond control. **Photos: Copyright © 1983, Warner Bros. Inc.**

future special effects stars such as Rob Bottin, Chris Walas, Phil Tippett, etc., etc., the film's success also enabling the young film-maker to join the 'majors'. After a stint on the aborted *Jaws 3 – People 0* at Universal, Dante went over to **Avco-Embassy,** where he made *The Howling.*

This remarkable werewolf picture, highlighted by outstanding Bottin special effects work, made Dante one of the 'hottest' directors in Hollywood. Following some time spent at Embassy on developing *The Philadelphia Experiment* (which coincidentally is now at New World Pictures under the aegis of John Carpenter), Dante was contacted by Steven Spielberg to direct *Gremlins.* However, *The Twilight Zone* was at the time entering production, and Dante was tipped to be one of the four directors on that film. Always amiable, Joe Dante spoke about his career on a recent evening in Burbank. . .



Subject of our interview, Joe Dante, lines up a low angle shot for dramatic effect in his segment of 'Twilight Zone – The Movie'. Photo: Copyright © 1983, Warner Bros. Inc.

SPACE VOYAGER: How did you get into movies?

Joe Dante: I got into movies the way everyone who is lucky enough to get in does. I went to a lot of movies and decided that was what I wanted to do. It was 25 cents on Saturdays, and they let in the first boy and girl for free. Then, you could spend all your quarter on jujy fruits, popcorn and turkish taffy!

That was back when the kiddie matinees would have ten cartoons and two features. They usually played Disney films on Friday and Saturdays. Sometimes, instead, they would show the science fiction films that had played on Wednesday and Thursday. That's how I got to see almost everything that was any good.

V: Did you like science fiction pictures even then?.

JD: Sure I did! What kid doesn't like science fiction pictures? I did my share of hiding behind seats, though. I remember when my father took me to see *Tarantula.* I was the cause of some amusement to the manager, who pointed me out to his assistant as I was worriedly pacing the lobby. I was so scared that I couldn't go back and see the film! Every so often, I would go and peek, but it was just too horrible and I would have to leave again. This made my father very happy, as you might imagine, because he was not likely to have gone to see *Tarantula* unless he was taking me. So he was just sitting there, by himself, watching this giant spider movie!

V: Jon Davison[2] told me that he convinced you to come to Hollyood. Is this true?

JD: Yes, he did. I went to art school and was going to be a cartoonist. At the time, I was working on a movie trade magazine for exhibitors, *Film Bulletin.* It was a great job, because I got to do nothing but see movies all day. I would see them before they came out, and often before they were cut. I wasn't really happy, but I was happier than I thought I probably deserved to be.

Jon and I put together a film called *The Movie Orgy,* which was a seven-hour compilation of scenes from 1950s movies. They were edited together to make a kind of story. We did things like edit together scenes of Morris Ankrum from different films of the period. He played an army general in a lot of them, and always wore the same uniform, no matter which studio made the picture. We found that, if you cut all these movies that contained the same actors together, you could make it look like the same people were fighting giant spiders, giant gorillas, giant anything!

There was more to it than that, but in a nutshell, that was the basic idea. We took it to colleges, and people still come up to me and say that it was the greatest thing they ever saw in their lives. It was designed, like life, to be able to be walked out on at any moment. When you came back, you hadn't really missed anything. In many ways it may have been the forerunner of today's TV movie!

Jon had come out here to work for Roger Corman in publicity[3], and he thought that perhaps I would be a good candidate for doing trailers. So I came out to help him on a trailer for a picture called *The Student Teachers.* Then, I went back to Philadelphia, thinking, 'Oh well . . .' I guess it worked out OK because Jon called later saying, 'They really want you to come and do trailers. We'll have a trailer department and, instead of having to go to a different editor on every picture, we'll have a person in-house, and they'll learn to do them the way Roger likes.'

I came out and did a trailer for *Caged Heat,* which was Jonathan Demme's first picture. I had never actually cut in 35 mm. Like everybody who comes out to work for Roger, I didn't know anything. So, I was going to work for almost nothing, which is why I was being hired! I somehow managed to learn how to cut in 35 mm and to make a trailer. To this day, the embarrassment that I feel at remembering the first rough-cut that I showed to Roger, is tempered only by the fact that I have since come to realise that he was used to seeing things even worse than that.

Things worked out, and I got a job in the newly-formed trailer department, which was myself and Allan Arkush.

V: Wasn't that boring?

JD: No, I love trailers. I'm one of the few people who can sit through a trailer marathon. There is a science to doing trailers, which has kind of been abandoned. If you look at old trailers from the '40s and '50s, they have lots of wipes and hyperbole, like written things and titles that wipe on and off. They have a sort of pace and momentum all their own. Trailers today tend to be narrated scenes from the film.

We experimented with different things because, with many of the pictures, we didn't really want to show too much. In fact, the best approach was not to show anything at all. We learned that, the more you showed people in the trailer, the less curious they were about the movie! I think that holds true for most movies, but particularly for movies that were made at New World in less than 20 days for no money!

We had favourite voice-over phrases, like, 'She Wanted Love, He Gave Her Terror and Death'! That was one that would find its way into almost every trailer!

V: How was it to work for Roger Corman?

JD: Well, he would come in, look at our trailers and say 'Make this shorter', or, 'Take five frames off here'. That was his speciality, taking a number of frames off a scene. He's very good at that.

It was a lot of fun, because you could learn an incredible amount of things about movie-making, by just watching a picture over and over. . . We did some reprehensible things too! We did trailers that got people to pay money to see *Tidal Wave,* and things we should probably be ashamed of! But it was actually kind of fun at the time. It was like putting something over. You really felt vindicated for all the work that you had done – even though you weren't paid very much – when you saw your spot on TV 25 times on Friday night. You knew that when people would go to the movie on Saturday, they would be disappointed. But, on Friday night, when they saw your spot, they were probably going to think that the film looked pretty good.

V: How did you get to direct your first film?

JD: To make a long story short, at one time we were doing three trailers simultaneously, one for *Amarcord,* one for *Street Girls* and one for *TNT Jackson.* We started to get footage all mixed up, and Fellini would be appearing amid this Kung-Fu footage. We finally said, 'I bet we could make one of these pictures. Look at this,

there are hardly five set-ups in the whole reel. We could do one of these.'

So, Jon, Allan and I tried to get together and convince Roger to let us make a picture. This is something he contends with frequently. Everybody who works for him, works there for one reason: they want to make a picture. Sooner or later, they come up to Roger and say, 'We want to make a picture.' And then he has to think of a reason why they *can't!* Because he doesn't want to let these guys make a picture! He's finally got them working to his satisfaction in the trailer department or whatever. The last thing he wants to do is to hire some new people to replace them, while these guys go out and make some picture which is probably going to be a disaster because they don't know what they're doing.

But we were very persistent. Jon managed to get Roger to let us make a film if it was the cheapest one that New World had ever made – and this was no mean feat, let me tell you! In substance, Roger said, 'OK, I'll let you make a picture, but you have to make it in ten days, and you have to make it for $60 000.'

This is similar to what he told Peter Bogdanovich, which was, 'You have to make a picture for a certain amount of money, you have to use Boris Karloff because he owes me three days, and you have to use footage from *The Terror*. After that, I don't care what you do!' That ended being *Targets*. We weren't lucky enough to have a picture that was as good as *Targets* come out of all this.

But we did use a lot of footage from a bunch of other pictures, and we made a picture about a movie studio that some have said seemed suspiciously like New World. It was called *Hollywood Boulevard,* a mistake I blame myself for, because it was not a good title[4]. I insisted on it because I thought that it was classier than *Hollywood Hookers,* which was what Roger wanted to call it!

V: Why wasn't *Hollywood Boulevard* more successful, in your opinion?

JD: We made a movie about itself, which was the cardinal sin of the century. With only ten days and $60 000, it was also not much to be about! It's big on hotel television now. They run it late at night, or whenever the slots are for pictures where girls take their clothes off. In this picture, the girls take off their clothes a lot! That was a prerequiste, and not one of the most entertaining aspects of the film. That was because *Hollywood Boulevard* came at the end of a series of movies that Roger was making, which would be about nurses or teachers. The formula was, that there were three girls who would get in trouble and take their clothes off. That was pretty much it!

All things considered, we tried to make it as personal as possible. Allan likes rock'n roll, so he put all this rock'n roll stuff with *Commander Cody and The Lost Planet Airmen.* I like science-fiction, so I had a guy in a Godzilla suit and Robby the Robot. We used Paul Bartel and Dick Miller, the actors that we liked the most from Roger's old pictures[5]. Jon produced it, and put the whole thing together for next to nothing, which was pretty remarkable. We saved a lot of money by being able to use our own cameras and lights as props, and the crew as extras.

V: Did you enjoy making the picture?

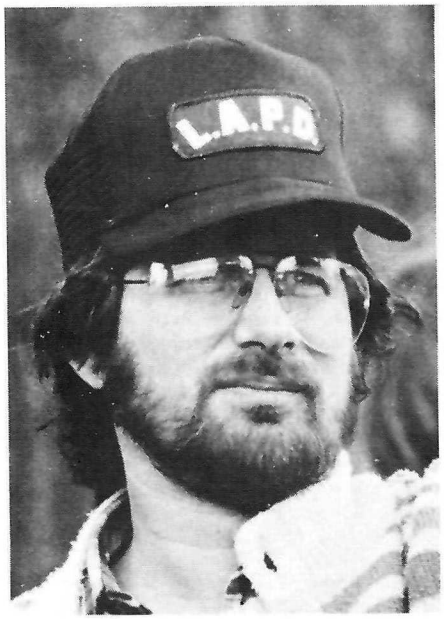
JD: It was a very interesting experience. I don't remember much about it, but people tell me that I had a good time! We learned a lot. It wasn't a movie for everybody. In fact, it turned out to be a movie only for people who were B-picture fans! It was so esoteric as to defy credibility. Vincent Canby reviewed it in the *New York Times* and claimed that it was set in the 1930s. It wasn't.

Anyway, the picture did not set the world on fire, so we went back to doing trailers. They were much better after doing this picture.

V: What happened next? Piranha?

JD: Well, a lot of other things came up, but none of them panned out. Roger was going to sell some pictures to TV and we were going to, maybe, shoot some extra scenes, which is one of his specialities. That didn't work out for some reason. Probably because, once they cut all the violence out, there was nothing left. He would have had to have shot a whole new picture, so he gave up on the idea.

Then, there were two pictures that he wanted to do, one was *Rock'n Roll High School* and the other was *Piranha*. Roger let Allan and me choose which one we wanted. Allan got *Rock'n Roll High School,* I ended up with *Piranha.* That was Roger's *Jaws* rip-off, which



Steven Spielberg at work on 'Twilight Zone'. Spielberg has also produced the film along with John Landis. **Photo: Copyright © 1983, Warner Bros. Inc.**

he had the temerity to wait two and a half years after the original to do! Then, he was going to release it the same summer as *Jaws II*, which was the multi-million dollar rip-off. The budget was $600 000, and the only reason he made it was because **United Artists** put up half of the money.

For New World, it was a fairly big picture. As it turned out, even $600 000 wasn't much money at all to make a film on location, but it enabled us to get Pino Dinaggio, and to put a classy veneer on it.

We were lucky that *Avalanche* was being made at the same time, and Roger was off supervising that. So he left us alone, and we got to do pretty much whatever we wanted. We didn't have to show it to him until we thought it was in half-decent shape. Usually, he makes people show him the picture on the second cut, when they're still a mess. Then, he can step in and 'save' the film.

V: Why did he let you out of the trailer department to do it?

JD: I think that Roger always liked us, because we had seen his movies. I don't know if everybody who came out of USC[6] and went to work for him, understood or liked his movies. We did, and I think he sensed that. So, we always had a good relationship. I never had any of the troubles with Roger that a lot of people have had. I think that, at a certain point, he must have just trusted us.

One thing about Roger, is that he's doing all this because he knows that it's the cheapest and easiest way to get movies made. But, on the other hand, he does at some point have to say, 'OK, I trust this person to be able to go out and make something that I can cut together and release.' Sometimes he's right, and sometimes he's wrong. His problem has been that, every time he's right, the person has had higher ambitions and left him to go on somewhere else. Every time he's been wrong, the person has not gone any further than working for him. I don't know if he respects that.

V: How did the making of *Piranha* go?

JD: It was one of those situations where, if I had known how impossible it was going to be to make the picture, I don't know if I would have. We had to shoot most of it underwater. I had to learn to scuba dive. Glug!

We also had a lot of special effects, but we had great people there. We had Jon Berg, Chris Walas, Phil Tippett and Rob Bottin. All of them were terrific, and some went on to do *Star Wars* immediately after. But none of us knew how to do the effects when we started. Nobody had really ever done convincing piranha effects. They had only photographed real ones. There was some 16 mm footage of them eating a cow. Every other time, in a film, all that they would show would be people flailing in the water.

Basically, we primarily ended up using puppets that we could control. They were fish puppets with mouths that moved. They would go underwater and eat into prosthetic limbs. We shot them at eight frames a second. They would move so fast that they actually did approximate the kind of movement that piranhas really do – which was remarkable and lucky for us! The one thing we couldn't do, because it was very difficult, was to have more than two or three of them in the shot.

V: How was working with big-name actors for the first time?

JD: Great, especially Bradford Dillman. He's no slouch, the guy's been in a lot of pictures. The people who are very secure about what they're doing tend to be, if you let them, very creative and to give you ideas about things. They tell you what they think about their character, discuss it with you as opposed to just walking in and doing it.

FOOTNOTES

1. In particular in Marc Scott Zicree's excellent *Twilight Zone Companion* Bantam Books, 1982.
2. Producer of *Airplane!*
3. At the newly-created *New World Pictures.*
4. Produced by Jon Davison, directed by Dante and Arkush, *Hollywood Boulevard* was written by 'Patrick Hobby', a name made up in the 1940s by Francis Scott Fitzgerald in a series of short stories about a desperate Hollywood screenwriter. Obviously, an in-joke pseudonym for Dante, *et al.*
5. Dick Miller was, among other famous Corman films, in *Bucket of Blood* and *The Terror.*
6. University of Southern California: famous Los Angeles film school, where George Lucas, John Carpenter, etc . . . studied.

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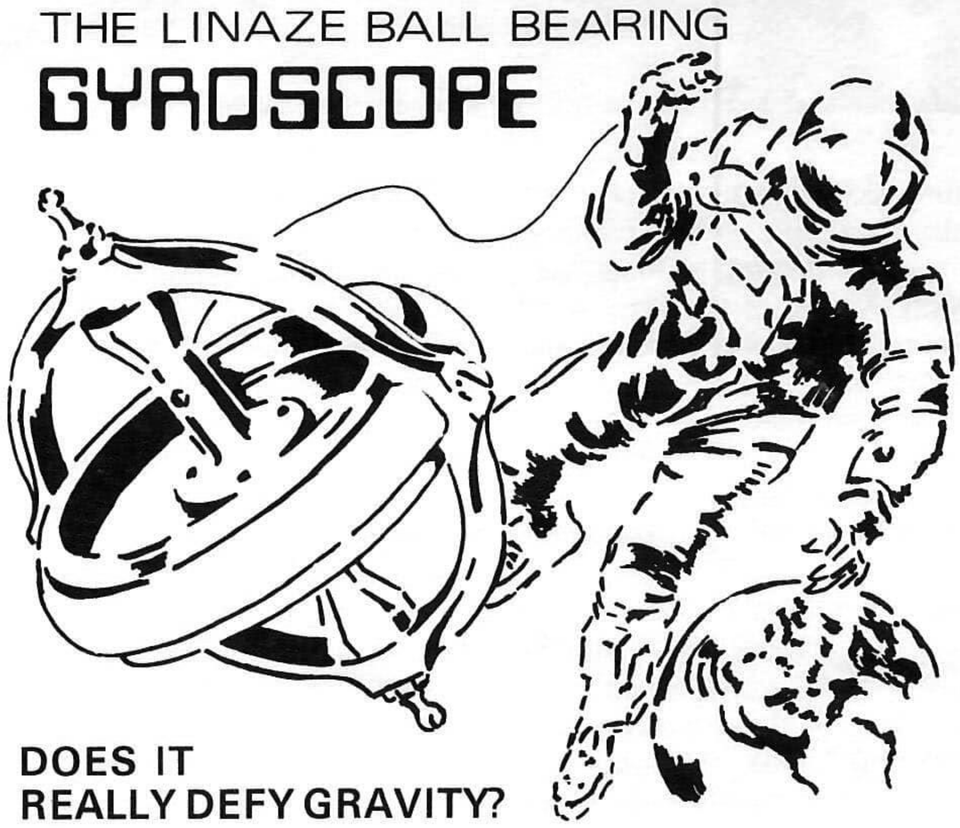

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PRODUCTS

Jedi Kits

First of the seven new *Jedi* kits to be available for review initially came courtesy of Tom West of **MPC.** Three of the new **Airfix** kits are 'snap-togethers' – the new *A* and *B Wings* and the modified *TIE Interceptor.*

The TIE is the closest to an existing *Star Wars* craft, with its extended 'wings' being the obvious difference. The construction is somewhat simplified, being a 'Snap', but if you want a fully-finished and painted model, there is a problem with the interior. It cannot really be assembled first and then the cockpit fitted, unless you rely on the 'snap' ability to assemble it first, paint, pull it apart and fit the interior and assemble it again. In other words, hand-paint it!

This problem does not occur with the new *A* and *B Wing* fighters, which can both be assembled first, and then pilot and cockpit canopy added. The *A Wing* is the more conventional, having a touch of *Y-Wing* about it. It features three skis for the undercarriage and twin guns which swivel. The colour scheme appears to be overall white, with a dark red band along the centre of the fuselage and, presumably, underneath as well plus the main bodies of the two engines. The guns are black, as is the cockpit interior. The undercarriage legs and engine afterburners (?) are a gunmetal colour. The scale for both models appears to work out at around 1/48th, or 1/50th, which will match the *X-Wing* kit (as against the 'Snap').

The *B-Wing* is one of those designs the *Star Wars* saga is becoming famous for, with an offset cockpit and one of the weirdest wing arrangements yet. I can just about see where it got its *'B'* wing name from – I think! The vertical wings fold flat against the horizontal, as per the prototype (!), and the cockpit section rotates. The scale is a lot smaller than the other two, 1/144th would be my calculation (which matches the *Hoth* and *Rebel Base* dioramas).

The overall colour is a bit more difficult to fathom out but it appears to be a darkish metallic green and our sample ended up in Humbrol *Dark Green,* with a mist coat of aluminium spray. All three 'Snap' kits (and presumably the 'Snap' *X-Wing*) have a common clear plastic stand that allows a certain amount of 'swivel' movement.

These kits are good additions to the growing *Star Wars* range, but pride of place has to go to the *Speeder Bike,* which is the fourth kit I've been able to build from these very early shots. And if the test shot is anything to go by, then this is, I would say, the best *Star Wars* kit yet. It depicts an *Imperial Stormtrooper* riding another ingenious design – a sort of snowmobile without tracks! The construction is far more complex than the previous three models as this is a 'proper' kit, consisting of over 80 pieces. The scale is probably around 1/10th to 1/12th, depending on how tall *Imperial Stormtroopers* are supposed to be! The gentleman in question is in six parts but went together, even in this test shot, with the minimum amount of filler required. (There's always invariably some needed, when one's dealing with a 'live' subject). A coat of Humbrol *Matt White* to prime the surface and then the armoured areas of the *Stormtrooper* can be finished in *Gloss White.* The black areas can then be hand-painted with Humbrol's very useful *Semi-Gloss Black 85.*

The bike itself is a fairly complex piece of machinery and I almost believe it could work for real. The kit is also fairly complex, but considering I was assembling it from one 'exploded view' drawing, it went together remarkably easily, which cannot be said of some kits – even with the proper plans in front of you. In fact, I was only left with two bits over – both pipes, and I feel that was *my* mistake! Colouring seems to be as varied as the *Stormtrooper* – the Imperial Forces are into black and white it seems. The body of the bike, and most of the engine assembly, foot rests, handlebars and the front spoilers(?) are gloss white, with the seat, rear air brakes(?) and the front forks in black. I varied the colour scheme somewhat by painting the hold-down straps of the cape behind the seat in grey and a few of the switches in red.

As I've indicated, the *Speeder Bike* is an excellent kit, and a fuller review will appear, once the kit becomes generally available. Of the three other *Jedi* kits, I can report from the exploded drawing of the snap-together *X-Wing,* that it matches, in spirit, the other snap-togethers – simple construction, but apparently accurate overall.

Tydirium Shuttle

The *Tydirium* shuttle boasts folding wings, an optional raised or lowered undercarriage, and a sliding ramp. Darth Vader and a pilot figure is included, and the scale is supposed to be around the 1/100th mark.

This new **Airfix** kit is a large model, well up to the standard set by the *Falcon, AT-AT* and *Snowspeeder.* Working features are limited to the giant wings that fold round through about 120° from the landed to in-flight configuration. The two gun turrets are attached to these wings, and the boarding ramp can also be made to move.

An undercarriage is included but, as the instructions point out, with the undercarriage down, the wings won't fold round completely to the in-flight position, so you have to decide in which attitude the model is to built. There is a fair-sized cockpit area, covered with a tinted canopy, and MPC have taken the opportunity to include quite a bit of internal detail unlike, say, the *Falcon.* Two pilot figures and seats are included, although no actual controls, but the general surroundings of this area appear to be authentic.

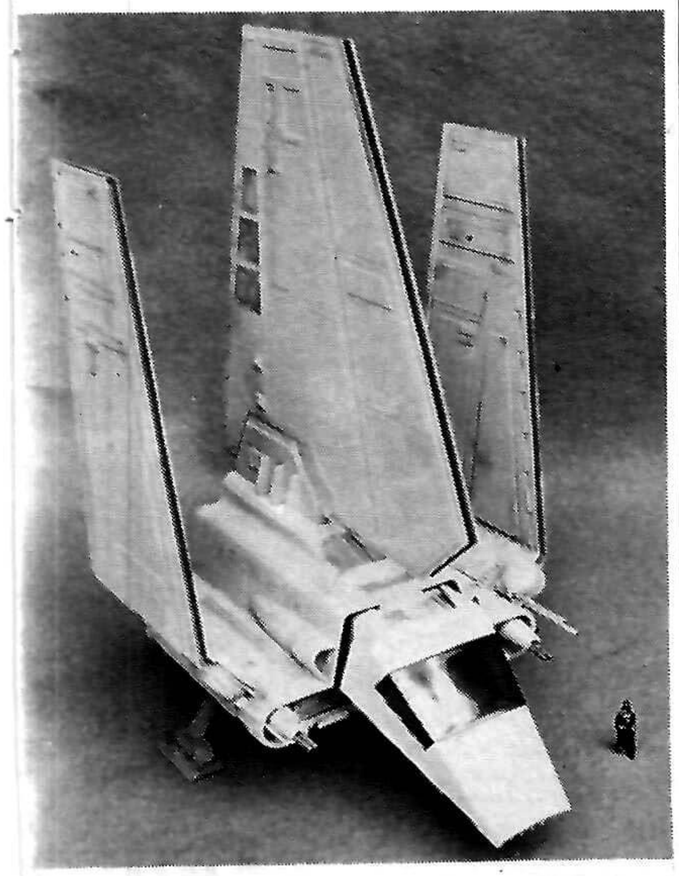
The working wings need a bit of care when assembling, as the circular hinges have to be assembled first, then both wings

Above and below, the new range of Jedi kits from MPC/Airfix. Above right, the Speeder Bike and, far right, the Tydirium Shuttle are perhaps the best of the 'Star Wars' kits to appear to date.

sandwiched simultaneously beween upper and lower fuselage halves. The upper 'dorsal' wing is by far the largest moulding, and has a couple of odd plates *(parts 47)* that fit into squarish areas on both sides of this wing. They don't appear to fulfil any function and I can only assume that they fill the gap created by the injection moulding process.

The colour scheme is a bit of a problem, as it always seems to be. The kit is moulded in a creamy grey colour, and the box art, of the SFX model, does look a light grey. I gave the sample a coat of **Humbrol** *Matt Light Grey* spray, which virtually matches the plastic anyway. Details to be picked out are the recesses in the wing leading edges – dark grey; the engines at the rear – light blue, and the crew uniforms – orange. Other details are left to the builder.

Scale works out to around 1/100th, and this can only be calculated from the figure sizes. Besides the two crewmen, a Darth Vader figure is included, designed to stand at the top of the ramp under the cockpit area. In this position he's almost hidden, but with the undercarriage down and the ramp extended, this is the configuration when the Shuttle first lands on the Death Star. And this brings an incongruity. The kit is named *Tydirium,* but the *Tydirium* was the shuttle the Rebel's had 'borrowed' to get our heroes onto the Star Destroyer. The inclusion of the Vader figure is obviously meant to represent the one that goes to the Death Star, which isn't – as far as I can recall – named in the film. However, details: the kit overall is an excellent one and a worthy addition to the growing range. **MI**



Whatever next? a wooden kit of the Space Shuttle Columbia from Guillows. **Photo: Mat Irvine.**

Wooden Shuttle

We've received a novel kit in for review and, even though I haven't as yet had a chance to build it, it's only fair to give it a mention now. It's a kit of the Shuttle Orbiter, but a kit with a difference, as this one is made up for the most part in wood! The manufacturer is **Guillows** who are well known in the States at least, for making flying models of aircraft in balsa. For First World War biplanes this is all very well and more or less matches the way the aircraft were put together in the first place, but how does it translate to the Shuttle? Well from my initial brief examination, very well it seems. The kit isn't entirely balsa, there is a fair amount of vacformed plastic parts to cope with complicated shapes such as the cockpit area, OMS pods, SSME bells and payload bay doors. However, all of the main structure, wing spars *et al* are formed from balsa, and built up in a very similar way to the real craft. The plans are very comprehensive and, although the parts are die-cut ready to be removed, this isn't a kit for the beginner, and it isn't a kit that should be approached lightly which is why I haven't been able to build it yet. The final covering is with **Solarfilm,** the sort that is used on flying model aircraft.

A host of details is included including Spacelab; the manipulator arm, and even the red covers designed to seal the engine bells when the Orbiter is on the ground. The final result should be impressive indeed. It is, at 1/77th scale, only slightly smaller than the large **Revell** and **Monogram** kits, and should take pride of place in any collection. A proper review will appear when I finally get a chance to complete the model. To date Guillows do not have a British importer, although any large US hobby shop should be able to help you. **MI**

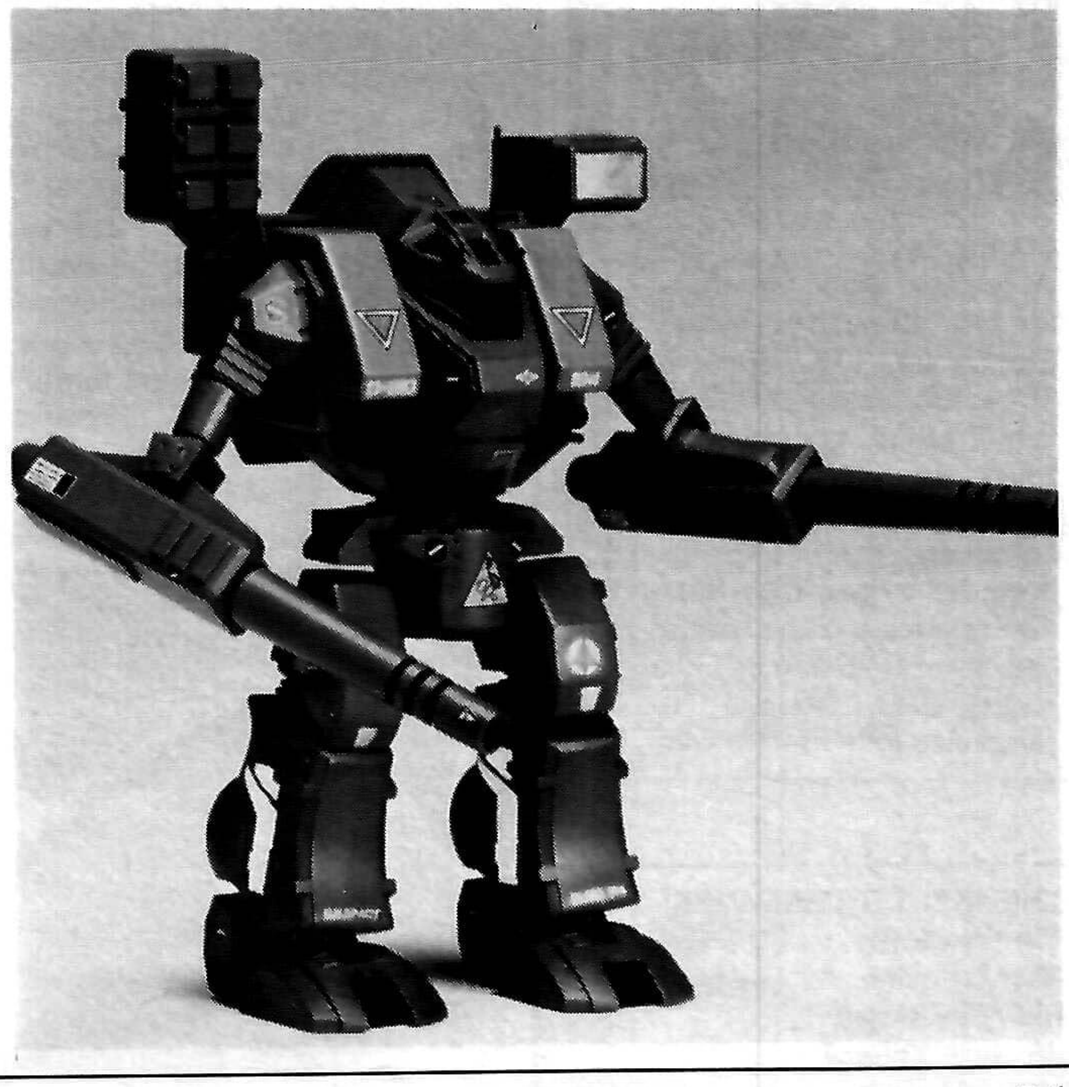
Imai's Robots

The robot craze has finally come to the UK. It doesn't matter if you haven't the faintest idea what the robot was from, and what its purpose is, the **Imai** kits are a hit. It all started in Japan (where else?) where these giant hunks of metal have been trampling their way across cartoon strips and TV screens for some years. The whole thing has developed into something of a cult over there, with every new kit release being snapped up like the latest single from Bowie. From the information that has reached these shores, the actual number of kits produced has reached incredible proportions, and would make any Robot section in a new Space Model list virtually impossible to complete.

I wouldn't have thought that they would have caught on over here, especially as there is no TV series running, and that most manufacturers seem to think this is of paramount importance. However, **Amerang, Ltd.,** have taken the risk with a selection of Imai robots, and it appears to have paid off.

The first batch resound with names like XS-14 DA-WEB; YP-23 MA-BRUM and Tactical Pod Glaug, and they are incredibly well moulded and detailed. They all feature moving legs, arms and armaments, and include a comprehensive transfer sheet. Even the scales are listed – 1/144th for the smaller kits, and 1/100th for the larger, which makes the 'real' size pretty impressive. Not the sort of thing you'd want to meet on a dark night! But then these robots are supposed to be on the side of good anyway – a modern equivalent of the Shogun. To date, all these kits are robots with the exception of the SDF-1 Cruiser-Fortress (scale 1/5000th!) which looks like an escapee from *Battlestar Galactica.*

The samples were kindly supplied by Amerang, Ltd., and in case of difficulty, the specialist Space Modeller's Shop – **Jones Models** of Chiswick – holds stocks. **MI**



PRODUCTS

New from Standard Games
Attention all gamers! Latest product from **Standard Games and Publications, Ltd.,** of Arlon House, Station Road, Kings Langley, Hertfordshire, WD4 8LF, is a large black felt hex, of the same size and quality as the green, sand and blue wargaming cloths they already produce. Also just released is *Speed and Steel,* a wargame set in the late 1930s and aimed at newcomers to the hobby.

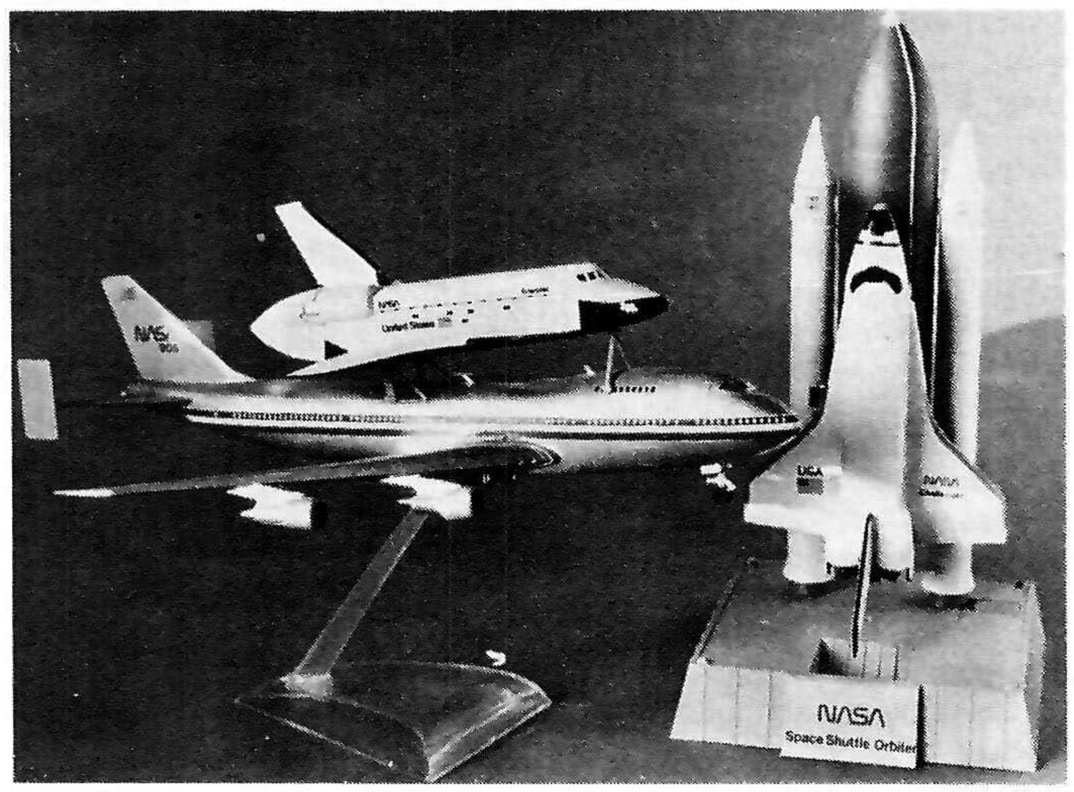
Out this month is *Thunde-rin-Guns,* a game set in the wild west, suitable for the mass market but also a fun game for the experienced gamer. Then there's *Siege.* This new game follows the format of *Cry Havoc* (see issue No. 4) and is set in medieval England, in and around a siege of a castle using scenarios playable with *Havoc.* Finally, the Dungeon Floor Plans and Accessory Pads have been improved. Now with full colour boxes, they include more sheets to include furniture, roofs, boats and skulls. Further details of all these items are available from the above address.

●

Felt-Hex and Jumbo Hex-pad
Do you sometimes feel that your wargames table looks unreal with its stylised hills, or do you even lack such terrain items? Do your ships manoeuvre on a strange-coloured sea? If so, your worries are now over with the production of this extremely useful item.

Felt-Hex, from SGP, Ltd., is a sheet of good quality felt 6 ft × 4 ft, plain on one side, printed in one inch hexes on the other; it is obtainable in green, sand or blue so that you can represent either grass, earth or water. Draped over a few books, or any lumpy items, it produces a most realistic terrain since it can be draped to give abrupt drops, gentle slopes or little ridges, while it can also be laid flat over an ordinary table to simultaneously protect the table surface and give the game an authentic base colour. An excellent investment which will last a lifetime of gaming and find many different uses.

Also available from Standard Games and Publications, Ltd., are A2 pads of large consecutively numbered hexes. If you need a large area of hexes for use in any type of game then you cannot do better than these. Clearly printed on good, heavy paper they will give excellent service for many purposes. Price of these items is £12.95 and £2.95 respectively. **TB**



Recent miniature Shuttle kits from Revell to 1/288th scale will provide easy-to-make replicas which will require little storage space. **Photo: Mat Irvine**

More Shuttles
First of the *Challenger* kits to arrive from **Revell** are the reboxed **Union** kits (from Japan) of the *Orbiter and 747* and the *Full Stack Complex* to the scale of 1/288th – both priced at £3.75.

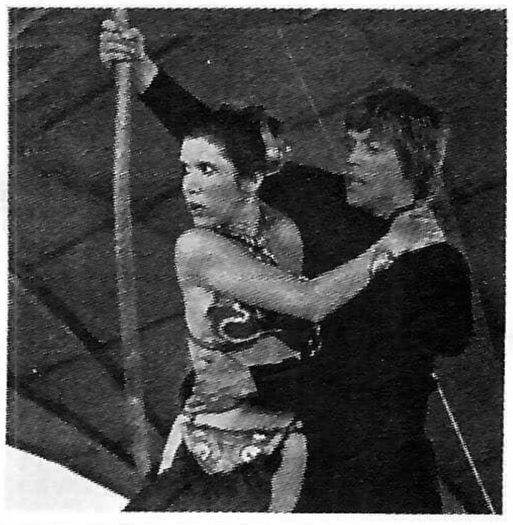
Both are simple kits and share a number of common parts. The 747 Ferry kit is the larger of the two, with the Boeing able to be built with undercarriage up or down. Panel lines are a little too heavy, though easily removed with fine wet-and-dry paper. The undercarriage itself is very detailed, with all the wheels being moulded separately. The Orbiter doesn't have this undercarriage option, although it would be quite legitimate to build the model with the Orbiter in position and the wheels lowered as during ALT – this was done a number of times. However, the boat-tail fairing used to streamline the rear of the Orbiter is included and, again, can either be fitted or omitted, both versions being correct. The front mounting can also be slightly lowered as this is set at the ALT height of 6°. For ferry purposes it has been lowered to only 3° (though, of course, the former would be correct for *Enterprise*). The Full Stack has similar Orbiter mouldings with the addition of the SRBs and ET as a two part moulding being the only addition, plus a semblance of a launch pad base.

The extras do lead to a problem when it comes to painting. The SRBs and the ET are now two different colours, since the latter is now unpainted, and left in natural polyurethene. As the parts are just split into front and back mouldings, the line between the SRB and the ET is very tight, especially when it comes to getting a paintbrush in. Even masking and spraying would be difficult. My recommendation would be to spray the SRs white for a start, and then hand paint the brown tank. This brown is a fairly bright reddish shade, though the instructions blandly state 'Matt Brown'. A one-to-one mix of **Humbrol** *9 (Gloss Brown, 62 (Matt Brown* in the same shade) and *133 (Satin Golden Brown)* is coming closer to the actual colour. The launch pad has the intriguing addition or rather in this case, omission, of what was presumably batteries and a switch. Exactly what they powered is a mystery, presumably the shuttle didn't launch, but four holes in the corners of the base could have been lights?

Simple as they are, both kits make up reasonably well and, after all, are a lot easier to sit on the sideboard than some of their larger cousins. They both also have an excellent sheet of transfers, which includes such goodies as the cargo bay door hinges, the entry hatch and the attachment points for the ground services at the rear of the fuselage. There are also the names for all five named Orbiters to date: OV-101 *Enterprise,* OV-102 *Columbia,* OV-099 *Challenger,* OV-103 *Discovery* and OV-104 *Atlantis.* (Should OV-105 materialise it will probably be *Endeavour,* but this name *isn't* included). There are also enough names, Stars and Stripes, and NASAs to place the markings on the wings, which is where *Challenger* carries them. Possibly *Columbia* will have this addition when she reappears later in the year. . . **MI**

Starfire, UK
More *Star Wars* merchandise in the form of flashing badges from **Starfire UK, Ltd.,** 8B St Vincent Street, Edinburgh, EH3 6SH. The initial range consists of Yoda, Darth Vader, C-3PO, R2-D2, Chewbacca, and an *X-Wing* fighter; each carries flashing LEDs powered by two **Ever-Ready** BLR 44 batteries and the badges retail between £2.25 and £2.99 apiece. Further *Jedi* designs are also scheduled for early release. **JS**

Jedi posters
As *Jedi*-fever continues unabated, the many spin-off samples of merchandise are selling like the proverbial hot cakes. Amongst a welter of items is a range of high quality posters from **Cauldron Promotions** of 47 Landseer Road, London, N19 4JG. There are five currently available, each measuring 35 ins. × 24 ins. approx, and costing £2.55 each, or £9.70 for all five – prices include postage and packing. The five posters depict the heroes on Endor, a Darth Vader background poster, Darth Vader issuing instructions, Luke and Leia on Jabba's Sand Barge, and Wicket the Ewok. Printing quality is excellent throughout and the posters can be recommended to all *Star Wars* fans. **RLR**



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MI: Mat Irvine
RLR: Ray Rimell
JS: Julie Stilwell

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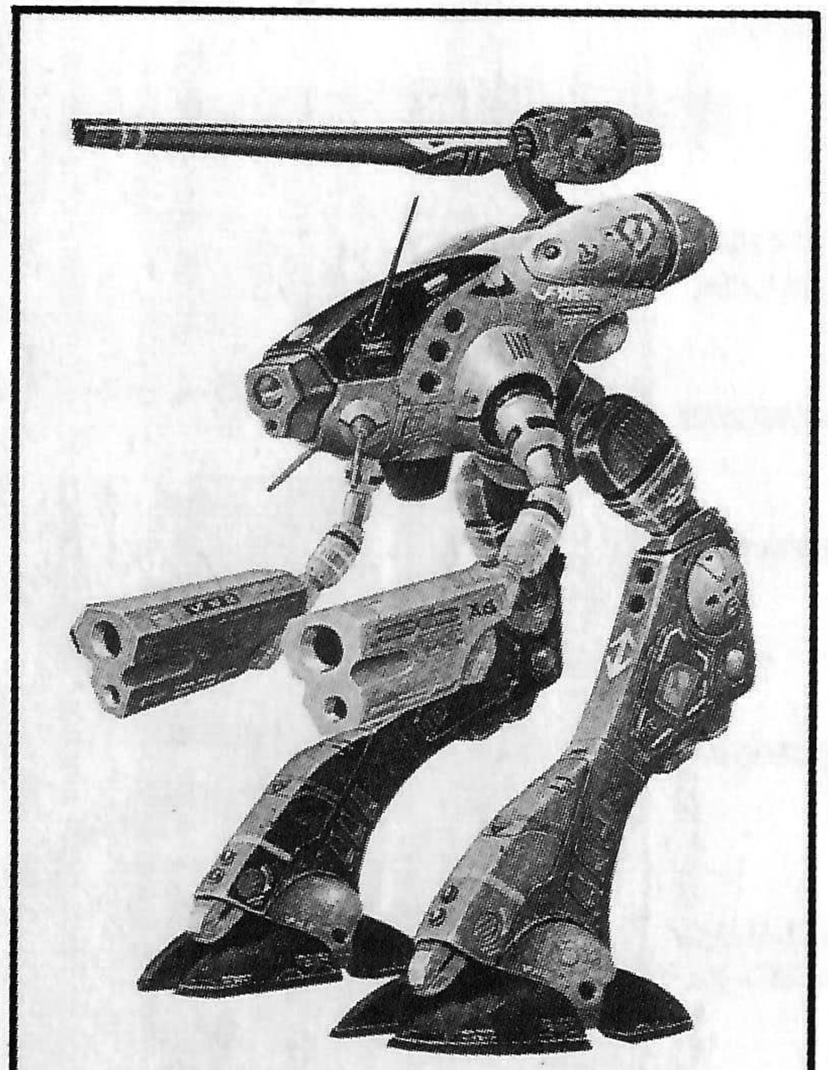

RETURN OF THE JEDI KITS

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THE MICRO REVOLUTION

JOHN CUNDELL'S INTRODUCTION TO HOME COMPUTERS – PART 2, WHAT TO CHOOSE

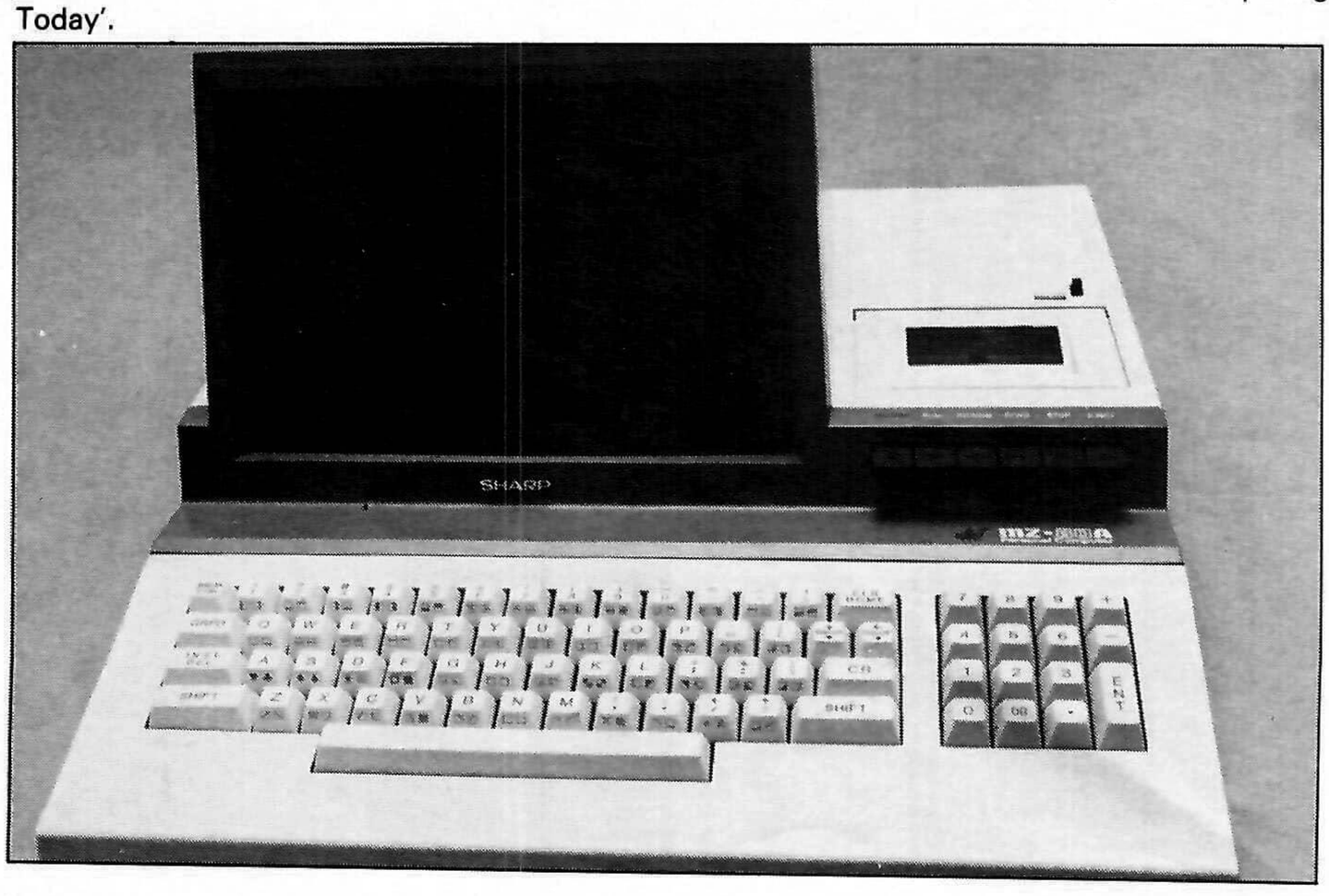
In the last issue I took a brief look at the history of the computer and examined miracles in miniaturisation, the concept of size and speed of operation; concluding with definitions of the MAINFRAME, MINI and MICRO. (Words in capitals are part of the necessary jargon which should be somewhat clearer by the end of this article.) In this issue I intend to stay entirely with the MICRO, take a hopefully not *too* technical look at how it works, clarify some of the jargon along the way, and offer advice on how to choose the machine that will suit you best.

Processing

A word that really sums up just what a computer does – process information. A computer works by carrying out simple and laborious arithmetic (adding and subtracting) at very high speeds, and the function which distinguishes the computer from a calculator is its ability to compare DATA and take subsequent action depending on the result of the comparison. It is this ability which gives the computer its apparent intelligence. Even relatively difficult calculations, comparisons, information search operations, etc., can be reduced to a simple arithmetical procedure. The DATA that the MICRO receives, modifies and transmits back to the user can be in the form of numbers, letters or symbols which we can understand. The computer does not understand or recognize these symbols as we do. They have to be translated into a code which the computer understands and then be reduced to a network of switches, each of which is switched on or off at very high speed. The younger readers of this magazine will have probably studied BINARY mathematics at school. BINARY is a system of numbering which uses 2 as its base rather than our more familiar DECIMAL or tens system. In BINARY notation there are only two digits, – 0 and 1, – which the computer can recognize as the absence or passage of electric current; hence our analogy with switches.

To count using the BINARY system one starts off normally; 0,1. Then it is necessary to 'carry one' to count further. Therefore 2 in DECIMAL becomes 10 in BINARY, 3 becomes 11, and 4 becomes 100. 84 is 01010100! The computer has no trouble with this system. Indeed it cannot work any other way. For us poor humans, though, it's a bit tough. Fortunately, you will never need to use BINARY within the normal confines of computer operation, but it is useful to know the system in order to understand where many computer parameters arise from. For example, the number 84 above was represented by eight switches. Most of the MICROPROCESSORS in personal computers, the magical silicon chip which processes the information, operate on the information in groups of 8 BINARY digits or BITS. If you sit and work it out the largest number that can be worked upon by the chip is 11111111, the decimal number 255. Any group of 8 BITS is called a BYTE. We shall return to the BYTE later.

The Sharp MZ-80A is one of the few integral machines available today; ie, with monitor and cassette in situ. New, costs around £500, but its predecessor, the MZ-80K, is very similar in performance and can be found for under £300 on the secondhand market. Photo: 'Computing Today'.



The System

All computers consist of the same principal components: INPUT-MEMORY-PROCESSOR-OUTPUT. It is a simple concept and, as can be seen, INPUT can be a variety of devices, although it is normally, of course, the KEYBOARD. The MEMORY stores the INPUT information, plus the required LANGUAGE to enable the PROCESSOR to translate our human symbols, and the operating rules or PROGRAM to enable the PROCESSOR to carry out the desired task. Finally, OUTPUT devices receive the processed information and present it to us on a VDU (television screen) or a PRINTER, or to an inanimate object such as a washing machine or a spraygun in a motor assembly plant, for example. Now let's take a look at the MEMORY.

Memory

The place where the computer stores the information that it is not actually working on. It can be thought of as a collection of boxes where the information resides in the form of electrical charges, our BINARY BITS. These boxes can be accessed by the MICROPROCESSOR which can attach itself to any of these boxes by specifying their ADDRESS. If we go back for a moment to our BYTES, and use two BYTES together as an ADDRESS for the computer's MEMORY, we will obtain (2 x 2 x 2 x 2 x 2 x 2 x 2 x 2) x (2×2×2×2×2×2×2×2) = 65536 different numbers, and that is how many memory locations the ordinary micro can cope with. The processor is capable of READING or WRITING all the MEMORY locations in a sixtieth of a second. All the characters on the keyboard, and other operating information, can be allocated a number between 0 and 255. This internationally-accepted code is known as the ASCII code (American Standard Code for Information Interchange). For example the letter A is given the number 65, the number 8 is given 56. Each individual MEMORY location has a capacity of 8 BITS, so it can store the code numbers up to 255. Hence all the recognisable human symbols on the KEYBOARD can be handled. If you need to store larger numbers, the computer will allocate several MEMORY locations.

The Processor

We have already briefly mentioned the PROCESSOR which takes the number codes from our ADDRESS in MEMORY and operates on them using instructions also taken from the MEMORY. The operation of adding, subtract-

ing or comparing the DATA will depend on the instruction. All this information, DATA and instruction resides in the MEMORY as a PROGRAM. Obviously, MEMORY size is important, if not the most important, parameter when considering purchase of a particular machine, so we had better take a closer look.

Memory Size

We have already worked out that the maximum number of locations at our disposal that can be handled by the PROCESSOR is 65536 or 64 x 1024 = 64 K. Note, in computer terminology, 1 K is 1024 and not 1000. Now, unfortunately, not all this 64 K is available to you as a user for a number of reasons. First of all, the chips that hold the ADDRESSES are usually able to accommodate 16384 BITS, therefore 64K BYTES takes 32 such chips. They are quite expensive, especially if you start off with a machine only having a relatively small MEMORY, with the intention of adding to it as required. There has been a marked drop in the cost of MEMORY chips recently and even the cheapest of home computers now have a full allocation of MEMORY chips, usually 48 K. Why not 64 K?

The reason is that some of the computer's MEMORY has to be taken up by an INTERPRETER. This is a special PROGRAM which converts a near English LANGUAGE into the BINARY codes that the computer loves and understands. The most common LANGUAGE is BASIC 'Beginner's All purpose Symbolic Instruction Code'. This LANGUAGE is usually stored in ROM 'Read Only Memory' – in other words the user can only order the PROCESSOR to READ, but not alter, the information stored in the chip. The ROM also stores the necessary SYSTEM OPERATING information which enables the computer to recognise which key you have struck or to display it on the VDU, to store or SAVE your programme (we will look at storage next) or to allow you to edit what is on the screen.

As this ROM contains the LANGUAGE with which you are going to communicate with the machine, it is obviously the feature which determines the friendliness, or otherwise, and the ease with which you will be able to write your own programmes. A friendly BASIC ROM will seldom be found in much less than 12 K. Therefore, microcomputers can seldom offer more than 48 K from the original 64 K for you to use as working MEMORY.

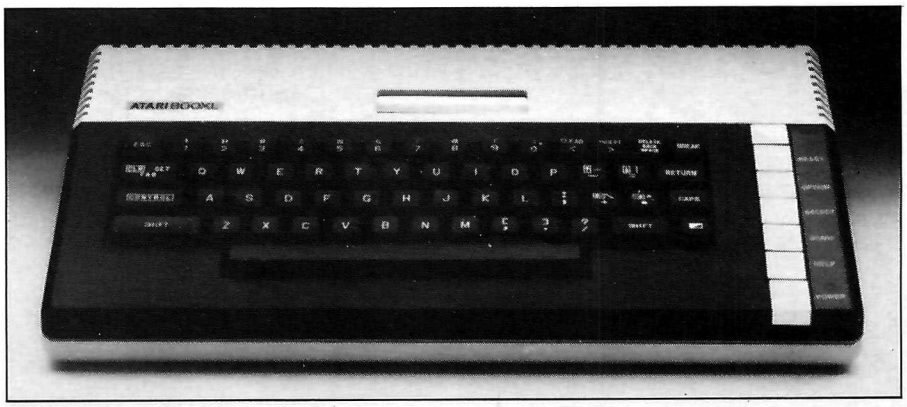
A number of computers, *eg,* the **BBC** unit, have space on their circuit boards allowing you to insert extra ROMS which could contain other LANGUAGES or UTILITIES. For example, a word processing package.

The usable area of MEMORY left to work with is known as RAM (Random Access Memory). Although minor miracles can be accomplished with very restricted RAMS, it is not unrealistic to demand that at least 16 K of RAM should be available as the minimum requirement for writing programmes of practical value. When the computer is switched off, the RAM loses its MEMORY. We therefore need some system of storing the instruction information and DATA when the computer is not powered up. The ROM information is retained in the chip when it is turned off and is immediately available on powering up again.

Storage

As all our information (or DATA) is made up of electrical signals, these can be easily turned into an audio signal and recorded on magnetic tape. With practically all home computers the ordinary cassette tape recorder is used. When the signals are stored onto the cassette, the computer can be switched off. Next time, it is simply a matter of switching on and LOADING the information by playing the cassette machine. It takes a relatively long time to SAVE and LOAD information, and there is a further disadvantage in that as the signals are recorded sequentially it is necessary to run through unrequired information to find that needed. Why, then, do we use the system? Simply because it is very cheap and a fine arrangement for the beginner or person who can afford the time.

The alternative is some form of DISK system where the information is stored on a kind of sophisticated gramophone record coated with the same magnetic material as used on the tape. This FLOPPY DISK, so called because it is exactly that, slots into a precision engineered drive which spins it at several 100 rpm while a READ-WRITE head can be positioned by the OPERATING SYSTEM to exactly the correct track – where it knows it previously stored the information – in a few thousandths of a second. The DISK is a much more satisfactory method of storage because any chunk of DATA on it can be READ typically in one-fifth of a second. Also, one FLOPPY could store up to half a million characters. So, why don't we all use DISKS? The simple answer is the direct opposite to tape-expense. The sophistication of the mechanics of the drive means that the cheapest of drives costs £300.



Top, the just released Atari 800XL, a replacement for the popular, but ageing, 800. Excellent graphics and sound and well-supported with software. Above, the Commodore 64, originally just under £400-now £229. Excellent value for money and also well supported with software. Right, the long awaited BBC was worth the wait, but it is now starting to look a little expensive, especially with only 32K of memory. **Photos: 'Computing Today'.**

The Keyboard

The KEYBOARD is often completely neglected by the purchaser in favour of exotic add-ons, a very negative approach as this unit is your major, usually the only, physical contact with the computer. Good KEYBOARDS are expensive, the main reason why you will seldom find a 'proper' typewriter moving KEYBOARD at the cheaper end of the market. There is the pressure pad type, *eg,* **Atari 400** and **Sinclair ZX81** and the halfway house of the calculator type key, *eg,* **Oric** and **Spectrum.** These are good compromises and are ideal for the average user, but if you intend to carry out

serious programming or, more importantly, word processing, then a typewriter-type moving KEYBOARD is essential.

The VDU

Most home computers are designed to display their OUTPUT on the domestic TV. To do this, a considerable amount of electronic wizardry is necessary to convert the computer's OUTPUT signals to a format which can be understood by the TV and during this transformation some clarity is lost. Some TVs are better than others. For some reason the **Sony Trinitron** range seem to work very well with many of the home computers. Others, particularly automatic tuning types, offer poor results. It pays to check out whether or not your set is suitable before purchase. There is seldom a problem with monochrome sets.

The ultimate answer if you want a perfect display is to buy a special sort of TV called a MONITOR. This will not receive TV signals and is solely designed to match the OUTPUT from a computer. Again, make sure you have the right MONITOR for your computer as a poorly matched MONITOR can be outperformed by a good TV. Although there has been considerable improvement recently in converting the computer signal for TV use, if you intend to carry out much colour graphic work, rather than just play games, a MONITOR is very desirable. The cost is from £100 for monochrome to £600 for a high resolution colour unit.

Screen Display and High Resolution Graphics

After the KEYBOARD, the type of display is also very important; after all you have to read it! The number of characters across and down the screen varies, however the generally accepted criteria is 40 across and 24 to 30 down. An average line of type on an A4 sheet of paper is 80, hence you can immediately see the limitation of presenting large tables of information or textural material. Some computers can support an 80 column display, but unfortunately few TVs can give a sharp readable image, hence one is back to buying a MONITOR. A number of home computers only offer 32 and one only 22 columns. Many users seem quite happy with this situation although I personally dislike the chunky effect they give and the limitations on displaying text.

Most computers employ a MEMORY-MAPPED screen. This means that the characters displayed on the screen are ADDRESSED in the MEMORY. In other words, a box is used to remember every allocated space on the screen. A 40 column by 25 row display would need 1000 boxes or 1 K of RAM. Most home computers have a facility for going into HIGH RESOLUTION. This means that much smaller dots, or PIXELS, can be addressed. The number of separately addressable PIXELS that can be displayed is a measure of the degree of HIGH RESOLUTION. 80 by 50 is poor; 240 by 200 is average and 640 by 256 is good. Some computers give you the choice of choosing the degree of resolution. However, be warned. Remember our little boxes. At 640 by 256 one has used up 20 K of RAM just to address one screen. It won't leave much room for the rest of the programme . . .

Peripherals

A PERIPHERAL is a device that can be connected to a computer to enhance its usefulness. Most computers have a number of sockets to which these devices can be attached in addition to those for connecting the VDU and the tape recorder. There are a bewildering number of so-called standard connectors to take PRINTERS, JOYSTICKS (for game playing), LIGHT PENS, SOUND SYNTHESISERS, etc. The subject is complicated and would need much more room than I have here, however the two popular BUSSES, which is the jargon for these sockets, are the RS232 and the CENTRONICS interface. If your machine has one or other of these then it will not be too difficult to connect PERIPHERALS to it.

Expansion

However much you weigh up all the pros and cons the time will come when you feel that the existing facilities offered by your machine are inadequate for your purposes. The usual area is MEMORY. If your first choice falls on a machine with a small MEMORY, you should determine if EXPANSION is possible. It may not only be a problem with RAM. You may find the need for extensive and/or quick access to MEMORY storage; so will your choice support the addition of a DISK system at a later date? Find out now as it could be a very expensive addition at a later date and in some instances not even possible.

Languages

Before we move on to discuss making that final choice, a few words about LANGUAGES. I have already mentioned BASIC, a LANGUAGE which is constantly denounced by the purists who claim that it is unstructured and leads to illogical and bad programming. Despite these criticisms, which are probably very true, it is fairly easy to learn and if used carefully, can lead to excellent PROGRAMS. If used badly in PROGRAMS which have many twists and turns it can be very difficult to trace BUGS (errors). Its major drawback, which will soon become apparent to anyone who takes the trouble to master it and write long PROGRAMS, is that as it is an interpretive LANGUAGE, *ie,* every command is translated line by line into the BINARY system understood by the computer and then translated back to BASIC before displaying the result on the screen; it is very slow in operation.

Furthermore it is very disheartening that for a LANGUAGE which was initially designed to remove the differences between HARDWARE (computers), it is impossible to RUN a PROGRAM written in BASIC for machine A on machine B. Most manufacturers add their own little extra commands to their BASICS, so making the LANGUAGE machine dependent.

Fortunately, once having learnt the basics (sorry) it is not too difficult to rewrite PROGRAMS to RUN on other machines. If a BASIC keyword does not exist on your machine there is usually a way around the problem. Perhaps the best advice to offer a complete newcomer trying to choose between machines, which are similar in all other respects, is to count the number of BASIC keywords supported. The larger number is usually the more powerful BASIC and will be more 'friendly'.

There are many other LANGUAGES designed for specific applications, FORTH, ALGOL, FORTRAN, COBOL, PASCAL, LOGO, etc. Many computers can offer some of these as ROM chips or, more likely, as taped or DISK PROGRAMS which can be LOADED into your RAM.

The Final Choice

Certainly spend as much time as you can learning about the various machines on offer and weighing up all the information thrust at you, or searched out by you, before making your decision. But, and it is a big but, once having made the decision, act on it. There is nothing to be gained by waiting for the next miracle in miniaturisation to arrive. The computer world is moving at such a rapid pace that you will simply be left high and dry and never gain that first, imperative, experience of programming a computer. It is almost certain that having taken the plunge, within a few months a new machine or upgraded model will be available at a lower price, but there is no way of putting a value on the experience that you have gained from your computer. Furthermore, you will almost certainly find that the machine cannot do tasks that you hadn't even thought of when you bought it. But on the other hand it will be capable of carrying out many more functions that you will find very useful and pleasing.

Support

There are two essential areas of support that should be seriously considered; maintenance and SOFTWARE. SOFTWARE is the name given to PROGRAMS. These can be written by yourself when proficient enough, typed in from magazine listings, or purchased on tape or DISK. Most of today's computers are trouble-free and it is probably true to say that if nothing goes wrong in the first 10 hours of operation then it is unlikely to go wrong in the next 10,000. However, if you do get trouble it is essential that you can either obtain a replacement, the course of events taken by most of the large High Street shops, or that your specialist dealer can arrange for, or offer, quick service.

SOFTWARE support is usually of major importance to most users. Not everyone has the time, or even ability, to write their own programmes and the availability of commercial SOFTWARE should be one of the overriding factors to consider, especially for the business user.

The two above considerations will probably aim you in the direction of a popular machine which may not particularly be the HARDWARE you would otherwise choose. This is an unfortunate circumstance and, of course, is the reason why a handful of firms dominate the market; but if you have even the slightest doubt that you are going to be lost without adequate support, then don't go for a way-out machine.

Where to buy

Specialist Shop or the Chain Store? It is not untrue to say that most of the High Street shop salespersons have no more idea of using a computer, or in assisting you in the correct choice, than flying in the air! If you really know what you want from your investigations then by all means buy from such an outlet as you will probably obtain your computer at a very competitive price. If, on the other hand, you are still not quite sure, then search the magazines for your nearest specialist dealer selling the machine, or machines, on your shortlist and go along and get some hands-on experience and professional advice. If still not happy, try somewhere else, but once found you will not regret the time and money spent on the search. It's a bit like finding a good garage!

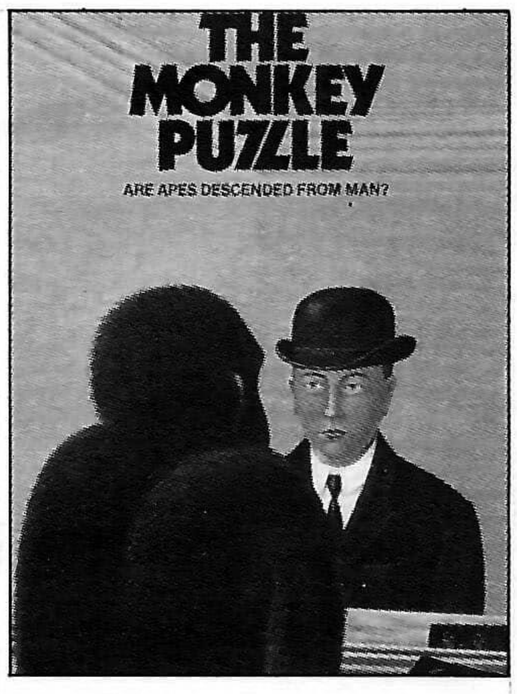
Finally, to reiterate an earlier statement – once decided, buy. You won't regret it and welcome to a fascinating new world. *

READ OUT

THIS ISSUE'S REVIEWERS:
Polly Curds, Mat Irvine, Nikki Jackson, Alex Stewart and Marion van der Voort.

Continued from page 25

distant past fit neatly into the story and I, for one, will be sorry when the saga ends. It's my sort of book. Is it significant that the only other people I have seen reading the book are also women? I wonder. They were reading with the same intensity that I must have exhibited to the outsider. I hope Julian May can produce a further supply of reading matter for me and many others of the same calibre as this, her first set of major works. **PC**



'The Monkey Puzzle' by John Gribbin and Jeremy Cherfas. Published by Granada at £2.95. Soft covers.

'Everyone is fascinated by the mystery of the origins of mankind' according to the authors. They are describing the research into DNA molecules, and the strange results so far, including an apparent close relationship between man and ape. This book wittily describes various findings, both of the molecularists and the paleontologists, tosses half a dozen earlier theories of man's origins in the air, and comes out with various ideas of their own. Finally it ends with a postscript that Richard Leakey is having second thoughts and is gradually approaching the views of the molecular anthropologists. As a layman I found the book both interesting and easy to understand, without having the feeling that I was being talked down to, and I am now looking for further reading on the subject.

'The Stainless Steel Rat for President' by Harry Harrison. Published by Sphere at £1.25. Soft covers.

This is the fifth book in the *Stainless Steel Rat* series. The title character is one Jim di Griz, who survives on intrigue and trouble, bored unless he's in the midst of it.

The story begins when a corpse is found on his home planet of Blodgett. In the dead man's mouth is a chewed up piece of paper, which bears the words 'Stainlus/ Steal Rata'. Interpreting this as a plea for help, Jim and his beautiful, but lethal, wife, Angelina set off for the planet Paraiso-Aqui, the dead man's home.

Paraiso-Aqui (literal translation – Paradise Here) certainly gives every appearance of living up to its name – it's sunny, hot, luscious and every tourist's whim catered for. Jim, however, becomes suspicious that all is not quite what it appears and that the people of Paraiso-Aqui are not leading the contented lives that they should. A series of events leads him to discover that the planet's ruler, General Julio Zapilote, is a tyrant and that he has been dictator for 164 years – being re-elected on a quadrennial basis with rigged ballots.

Jim joins forces with a small resistance movement and is persuaded to stand as a Presidential candidate at the impending election. There are various attempts made to get him out of the way, but as he has the combined talents of James Bond, Superman, Flash Gordon and Spiderman, it's really no surprise that he survives to see the ballot papers counted! He scuppers President Zapilote, restores democracy once again and the people of Paraiso-Aqui all live happy every after. This book makes very light reading and I found it silly rather than funny. Nevertheless, in its own way, it was entertaining enough to make me think about reading the others in the 'Rat' series. **NJ**

'Vaneglory' by George Turner. Published by Sphere at £2.25. soft covers, and 'Yesterday's Men' by George Turner. Published by Faber and Faber at £7.95. Hard covers.

George Turner originally wrote a book called 'Beloved Son', now published in paperback by **Sphere,** that told of an expedition to Barnard's Star, using suspended animation techniques. While it is away, the world finally crawls to a halt, with crops failing, and then slowly starts reviving. By the time that they return, the majority of the older people are dead of starvation, etc., the survivors, are living a strict basic economy and the 'Gone Timers' as they are called, are despised and hated.

Vaneglory is the sequel. The world has been swept by a religous revival, headed by Security, and then suddenly it is discovered that intermingled with the humans are mutants that are practically immortal, many of whom have already lived some thousands of years.

Yesterday's Men carries the story on yet again. Colony satellites have been set up, the search for longevity seems to be useless, the 'Ethical Culture' is cracking at the seams, and finally it is decided to set up an experiment to decide whether the 'Gone Timers' destroyed themselves because of the errors in their culture, or because it is natural for mankind to be violent. No prizes will be given for the answer.

It seems appropriate that a writer like George Turner should be published on the eve of 1984. He is essentially an Orwellian writer, I am tempted to describe him as an Orwellian character, with everything for the worst in all possible worlds. The books are clever, but not really alive; the people are posturing puppets, and most of them are unpleasant. The few pleasant characters always seem to end up being ground down, another echo of 1984, or perhaps not. At least Orwell's work ends with the Proles gaily living out their lives as usual. As a Prole, rather than an intellectual, I can't help feeling that maybe intellectuals could do with a little persecution, but Turner's books leave me with the feeling that if all these nasty little people want to upset each other, is it really necessary to bore the rest of us?

'Sharra's Exile' by Marion Zimmer Bradley. Published by Arrow at £1.95. Soft covers.

Darkover is probably one of the best-known fictional worlds, but for the benefit of new readers, it is a world lit by a red sun, more than one moon, with hot plains and cold harsh mountains, and various indiginous races. Ages ago a Terran colony ship crash-landed there, and the colonists settled down, intermarrying with the natives and, over the millenia, through cycles of civilisation and destruction, developing psychic powers.

Finally, the Terran Empire discovers their world, in a convenient place for their expansion. Not realising that the Darkovans are of Terran descent, Terra expects that the planet of barbarians will succumb to their civilisation, but they are wrong. Slowly they begin to understand that this backward world, to their eyes, where few can read or write, and where all long range weapons are banned, in fact is not barbarian, merely frightened of their own powers, and the sneered – at superstitions and legends are horrifying facts, capable of destroying cities.

Marion Zimmer Bradley has written several novels of Darkover, from the time of the first ship landing until the acceptance of Darkover as an equal with the Empire, but concentrating on the first few generations of the meeting of Terra and Darkover.

An early book, *The Sword of Aldones*, tells of the aftermath to the attack on the Terran spaceport by Sharra, the goddess of the forge-folk; *Sharra's Exile* is that early book rewritten, or, to quote Marion herself, 'an entirely new book based on events in the same time frame as *Sword of Aldones*'. It is enthralling, charting the cross-currents between patriots on both sides, half-Terrans and half-Darkovans, depending on their loyalties, with the fiery shadow of Sharra – the goddess Herself, threatening friends and enemies alike, until the entire world is on the edge of disaster and another legend comes to life. Even if you have already read *The Sword of Aldones*, do read this, it is bigger, more detailed, and shows how much Marion's talents have matured and deepened in the last 20 years.

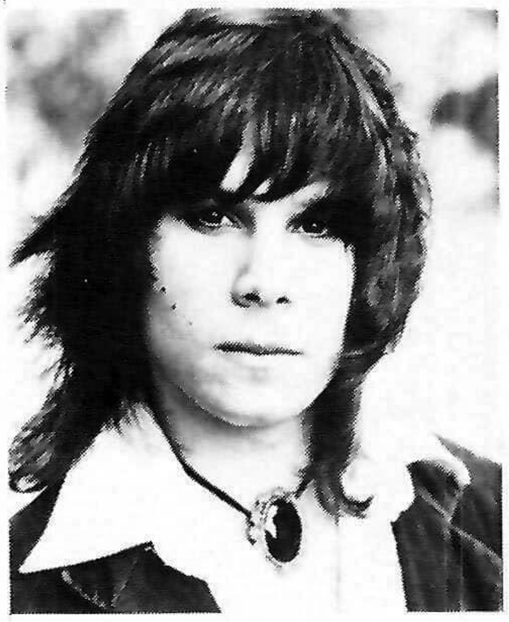
'When The Wind Blows' by Raymond Briggs. Published by Puffin at £1.95. Soft covers.

Billed as a devastating black comedy, this is a cartoon strip of the effects of a nuclear war, as seen through the eyes of innocuous, stupid, retired Jimmy and Hilda. The fashion for stories of total destruction seems to be coming round again, after the Big Bang Boom in the fifties, but at least it wasn't meant for children then. I hope that there will never be a nuclear war, but cannot feel that I, or any of us, can do anything to prevent it, so why not read Raymond Briggs' 'Father Christmas' instead?

'The Winds of Change' by Isaac Asimov. Published by Granada at £7.95. Hard covers.

Yet another collection of Asimov's short stories, quite readable, but notable only for his dreadful puns. If you can't stand them, do not attempt to read *Death of a Foy*. It may be hazardous to your mental health! **MV**

SOUND & VISION



The music of Neil Norman

Versatile young American musician, Neil Norman, has always been a devoted fan of science fiction films, and reckons to have seen just about every one made to date, but his imagination is fired not only by what he sees but also by what he hears. Neil plays several instruments, composes, sings, arranges, and also supervises production of his own range of SF music and soundtrack albums for father Gene's company, **Crescendo Records.**

From an early age, Neil decided that if he enjoyed listening to SF soundtrack music, then many others might share his enthusiasm. The result has been a quartet of generally-acclaimed albums: *Not of This Earth, Greatest Science Fiction Hits I, Greatest Science Fiction Hits II,* and *Music from the 21st Century.* (For a review of three of these albums, see Mat Irvine's appraisal elsewhere in Sound and Vision).

Neil has enjoyed a sound musical background and played in a large number of rock groups whilst still in high school. He backed bands like 'The Monkees' and 'Bo Donaldson and the Heywoods' as well as performing studio work in London. His first LP, *Phaser – Laser,* a true rock instrumental, was released in 1973. Subsequently, Neil's love of SF led him to record his versions of many famous science fiction film scores for his next 'waxing', *Not of This Earth.* In a recent interview with *Starlog* magazine, Neil elaborated further:

'The first album has a lot of my original rock stuff with vocals and synthesisers. Being interested in science fiction movies, synthesisers had always fascinated me. When I was about 18 or 19, I got my first one. The two pure SF albums (*Greatest Hits I* and *II*) are orchestrated with a lot of synthesiser. There are no vocals because they're inappropriate on these records.'

Selections on the first discs include themes from *Alien, Star Wars, CE3K, Star Trek, The Outer Limits, Space 1999* and *Battlestar Galactica.* This impressive mix of avant-garde SF music scores will satisfy most collectors since a number of themes are unavailable elsewhere. Neil has a strict formula which dictates the inclusion of suitable material:

'It's got to be a good film or TV show and very good music. I try to avoid using good music from a lousy film and vice versa. Also, if the cut that I pick is already available on the original soundtrack album, I usually do my own version of it, whereas if it's not available at all, such as *The Outer Limits,* I try to copy the original exactly so that people can have an exact recording without the soundtrack album. It's ridiculous to copy, say, *Star Wars* exactly, so I'd do my own version.'

A lot of Neil's time is taken up with working on many aspects of marketing his recordings as well as studio work on guitars and synthesisers. He also involves himself very much with the business side of his father's company, overseers cover production and selects the cover artists. Promotion is also handled by Neil who attends many of the SF and fantasy conventions held throughout the USA. It is discussion with fans at these events which influences his choice of tracks and he admits that he gains a great deal of pleasure and encouragement from such feedback.

Nevertheless, as in every field of endeavour, there are problems, and Neil admits that some fans are wary of his productions simply because they are his *own* arrangements rather than the original scores. This tends to annoy him for his enthusiasm and dedication to his career is such that no effort is spared in making his music, 'sound really fantastic and the money is being spent to do just that'. To ensure that the quality of the music is upheld, Neil endeavours to recruit the same musicians who played on the original recordings whenever possible. On *Volume II,* he managed to feature John Guerin, drummer from *Buck Rogers* and *Voyage to the Bottom of the Sea*'s Cathy Gotthoffer.

Neil is currently hard at work putting the finishing touches to *Greatest Science Fiction Hits III* and the tentative line-up of tracks for this album will include: *The War of the Worlds, The Prisoner, Raiders of the Lost Ark, Return of the Jedi,* and *E.T.* Release of the disc is expected later this year.

Hitherto, these collectors' albums have been very difficult to purchase outside of the United States, but now, by a special exclusive arrangement with Crescendo Records, *New VOYAGER* readers can obtain Neil Norman's albums direct from Hollywood through the advertisement on the opposite page. **RLR**

SF albums. Neil Norman. *Cresendo Records.*
For some years now, film and TV music collectors in America have had the opportunity of obtaining a series of albums by the talented musician, Neil Norman. Combining his flair for the fantastic, and with the invaluable

VIDEO GAME NEWS

Above: hot on the heels of two very good games, *Ms Pac Man* and *Centipede,* **Atari** have just launched *Jungle Hunt* and *Galaxian* (the latter based on the popular arcade game). *Jungle Hunt* is an adventure game in which you must guide 'Safari Sam' through four dangerous terrains to rescue a young maiden. Swinging on vines and swimming crocodile-infested rivers are just two of the hazards he encounters.

Galaxian features wave upon wave of alien warships attacking at an ever-increasing speed. Graphics and sounds are faithful to the original we're assured.

Right: **Parker** have two new releases for VCS consoles. *Action Force* takes its name from the **Palitoy** range of toy figures. The scenario involves a battle between *Action Force* and an evil combat machine in the shape of a giant cobra which looms over the AF training centre. This game can be played by one, two or three players.

In *Sky Skipper* the player has to fly an aeroplane through a maze to drop bombs on a gorilla that holds animals captive. Below right; The *Great Wall Street Fortune Hunt* is **Philip**'s third combination board/video game for their G7000 console. As the name suggests, this one is based on the world of investments – a race to become a financial whizz kid. The attractive package comes complete with video game, board, counters, investment record sheets and lengthy instruction booklet – a game for the long winter evenings. . .

assistance of veteran composer Les Baxter in arrangement and production, Neil Norman has, on *Greatest Science Fiction Hits, Volumes 1* and *2,* managed to perform a good percentage of the world's famous SF themes, ancient and modern.

Volume 1 contains, besides more expected pieces as *Star Trek, Battlestar Galactica* and *Close Encounters,* such gems as Dominique Frontiere's theme to the original series of *The Outer Limits.* And it's a fairly faithful version of the evocative music that accompanied one of the best series of SF stories on television, even if British viewers had to wait nearly 20 years to view them they were worthwhile.

Also to be found on *Volume 1* is the theme to *Space 1999,* not widely available; *Godzilla,* and a snippet from Bernard Herrman's score from the classic *The Day the Earth Stood Still.*

Volume 2 entertains you with more goodies such as John Williams' theme to the TV series

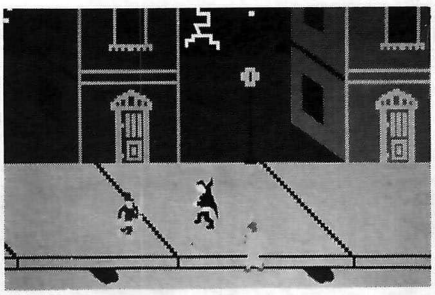
The Time Tunnel and, a real classic this, the Leon Klatzkin music to the original *Adventures of Superman*! Some tracks, perhaps, do not come off quite as well as most. The attempt at *2001*'s *Also Sprach Zarathustra* is brave, but the only 'jazzed-up' version I found that really worked was the one by Deodato although, interestingly enough, Les Baxter also had a similar version of this famous theme out at around the same time – it didn't catch on in the same way as the Deodato version however. *Dr Who* can also be found, on *Volume 2,* but the track is very short and doesn't really do a great deal for the Ron Grainer theme. In fact, most of the tracks are relatively short, most averaging out over two to three minutes which is, however, perfectly adequate for covering pieces of music invariably written to span a far shorter period of time. These two albums, then, contain a really good selection of most enthusiast's favourite SF themes, many of which you are not going to obtain any other way. Even the covers are collectable in their own right. *Volume 1* has a rare still from *This Island Earth,* with Exeter's craft landing on Metaluna. *Volume 2* features a collage by *Starlog*'s Howard Zimmerman, assembled from – I think – 35 different stills, including from *Dr Who,* three of Neil Norman himself and one odd one that appears to have crept in of a Gerry O'Neill Advanced Cylindrical Space Colony!

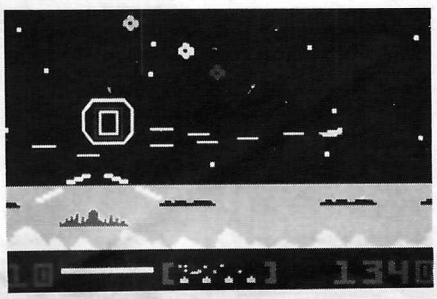
Neil Norman has also collected together a series of tracks from various musicians under the title *Music from the 21st Century.* Most well known (in Europe at least) will be Tangerine Dream, who themselves have written and performed a few film scores. Here, though, they are represented by the track *Tangram* which, at 19.20, is by far the longest on the record. Obviously with eight different performances, the tracks are all individual. Some are immediately approachable. I particularly liked *Karavan* by Steve Roach, and Cuban Alex Cima's two contributions *Primera* and *Lithium.* The latter has a definite ELO touch to it. Other tracks are more disturbing. Don Preston's *On the Throne of Saturn* demonstrates a certain Frank Zappa influence and Zappa did, indeed, add his peculiar talents to this track. An interesting collection. MI

Right, **Imagic** have three new game cartridges for **Mattel Intelevision** owners. In *Dracula* you are the evil Count and have to search for victims to quench your thirst and maintain energy. Rise from your nesting place and fly off into the night as man or bat – but be careful of white wolves and men with pointed sticks!

For *Nova Blast* you must pilot your craft across the arid terrain defending your cities from alien air and ground attack. Once a city's force field collapses, another hit will eliminate it. Engage the enemy in a galactic dog fight, locate and destroy anti-aircraft guns. Beam up fuel as you run low. Only you can prevent catastrophic losses.

An isolated castle, killer icebergs and the Frost Giant are just a few of the ingredients found in *Ice Trek.* This game features the legendary Nordic hero, Thor, who travels across three different fields of play encountering many hazards on the way, animal as well as geographic. SA





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SHUTTLE

Continued from page 53

The Enterprise at Stansted

Stansted Airport is the smallest 'London' airport, though for the couple of days around June 5 to 7 it probably saw more visitors than Heathrow and Gatwick combined. The occasion was the visit of the Shuttle test Orbiter *Enterprise* aboard the Shuttle carrier aircraft NASA 905.

While in Europe for the Paris Air Show, NASA had decided to tour the combo, firstly to Germany before the show, and then the UK after. The Sunday of the 5th was – luckily – bright and clear and watchers around the London area were treated to the sight of this amazing duo flying low over the Thames before making its way out to Essex.

At Stansted, which had taken on a carnival air, the first glimpse came from the north and watching, luckily from very close to the runway, we saw the 747 first make a very low – wheels down – fly past then do one and a half circuits before actually landing – this time from the south.

With very little delay NASA 905 and her load taxied into the specially-prepared area to a crowd of what was estimated at $\frac{1}{4}$ million of probably the most enthusiastic visitors of her whole European tour. Local dignitaries welcomed the flight crew and NASA officials on board which included astronaut Paul Weitz. Weitz first flew as pilot aboard the initial Skylab manned flight – Skylab 2 – and was responsible, with his colleagues Charles Conrad and Joe Kerwin, in saving the crippled space station.

The first impression you got standing – as I was – virtually under the craft was one of pure size, coupled with the thought that the Orbiter is only attached at three points which seem remarkably fragile! The second most obvious factor is that the two craft have gone through a colour change. NASA 905 now has her own paint finish, instead of relying on the slightly modified *American Airlines* of her original job. And Enterprise now looks like her sisters, at least externally, for the distinctive black HRSI-look-alike areas have been re-painted matching more closely the space-borne versions. This, initially, was the quickest way to tell *Enterprise* from the other Orbiters as the original scheme was far simpler – now it will be more difficult to tell them apart!

There was one intriguing addition to the Boeing which, unfortunately, reflects the current state of the world. Under the wings, and on either side of the four engine pylons, were odd rearward facing pods – two per pylon. These were pulsing infrared

Above, thousands of people flocked to Stanstead last June to see the Test Orbiter Enterprise atop NASA 905.

Photo : Mat Irvine

Continued on page 74

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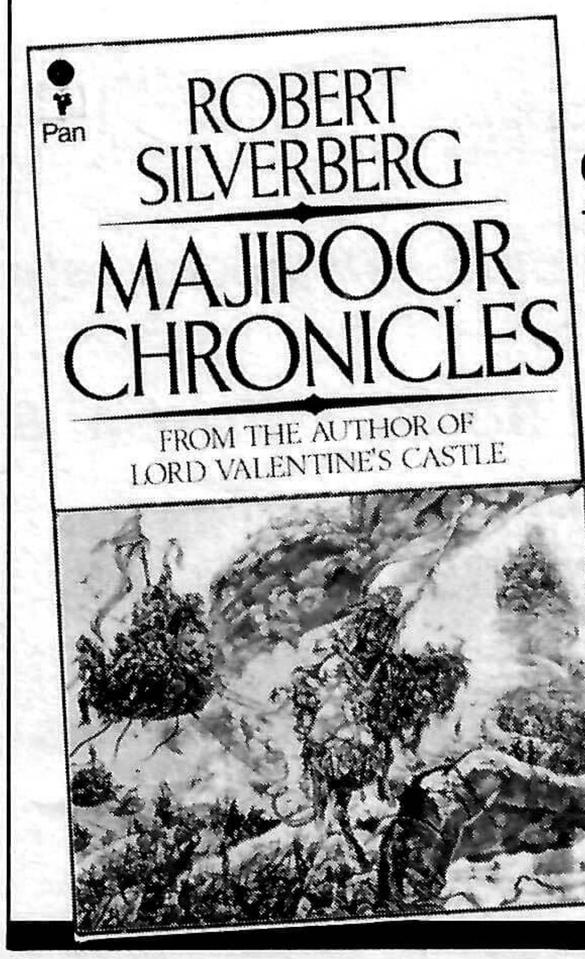

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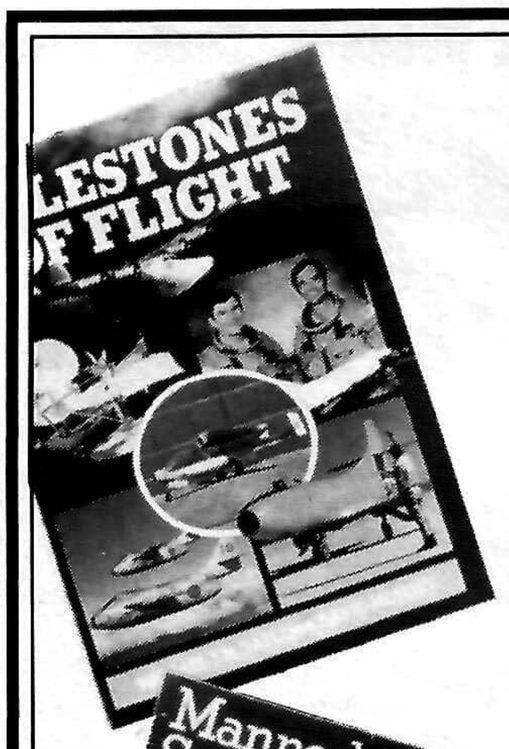

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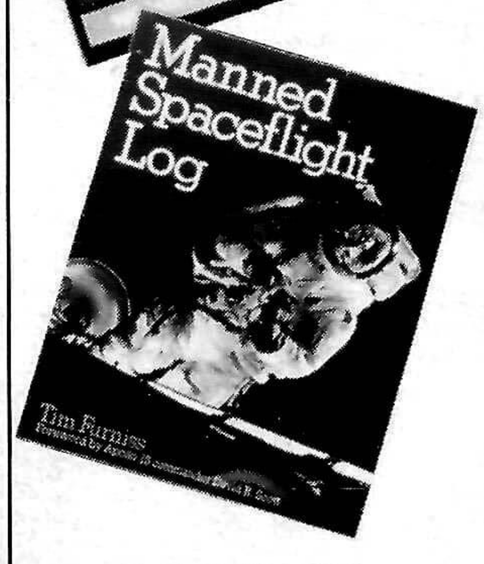

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SHUTTLE

Continued from page 70

countermeasure pods, to protect the aircraft from anti-aircraft missiles during the tour. As benign as the mission to Europe was, NASA were still worried about possible sabotage, not so much for the *Enterprise's* sake – she has fulfilled most of her tasks and is – if the worst came to the worst – expendable. However, there is only one NASA 905, and if anything happened to the Boeing, there would be no means of transporting the space-borne Orbiters across the States. The ceremonies finished on the Sunday, with the naming of a new Air UK (which operates out of Stansted) Short Bros aircraft 'Enterprise' in honour of the special guest and, as a side-line attraction, one of the few remaining B-17 Flying Fortresses did a couple of flypasts.

The Shuttle combo remained at Stansted until Tuesday 7, when it took off later in the morning for a flight over a fair percentage of Britain before setting out back to the States.

Although she never flew into space much, I suspect, to the dismay of the thousands of *Star Trek* enthusiasts who had campaigned long and hard to have the first Orbiter named after their beloved starship, *Enterprise*, still did stirling work, paving the way for her second-generation sisters.

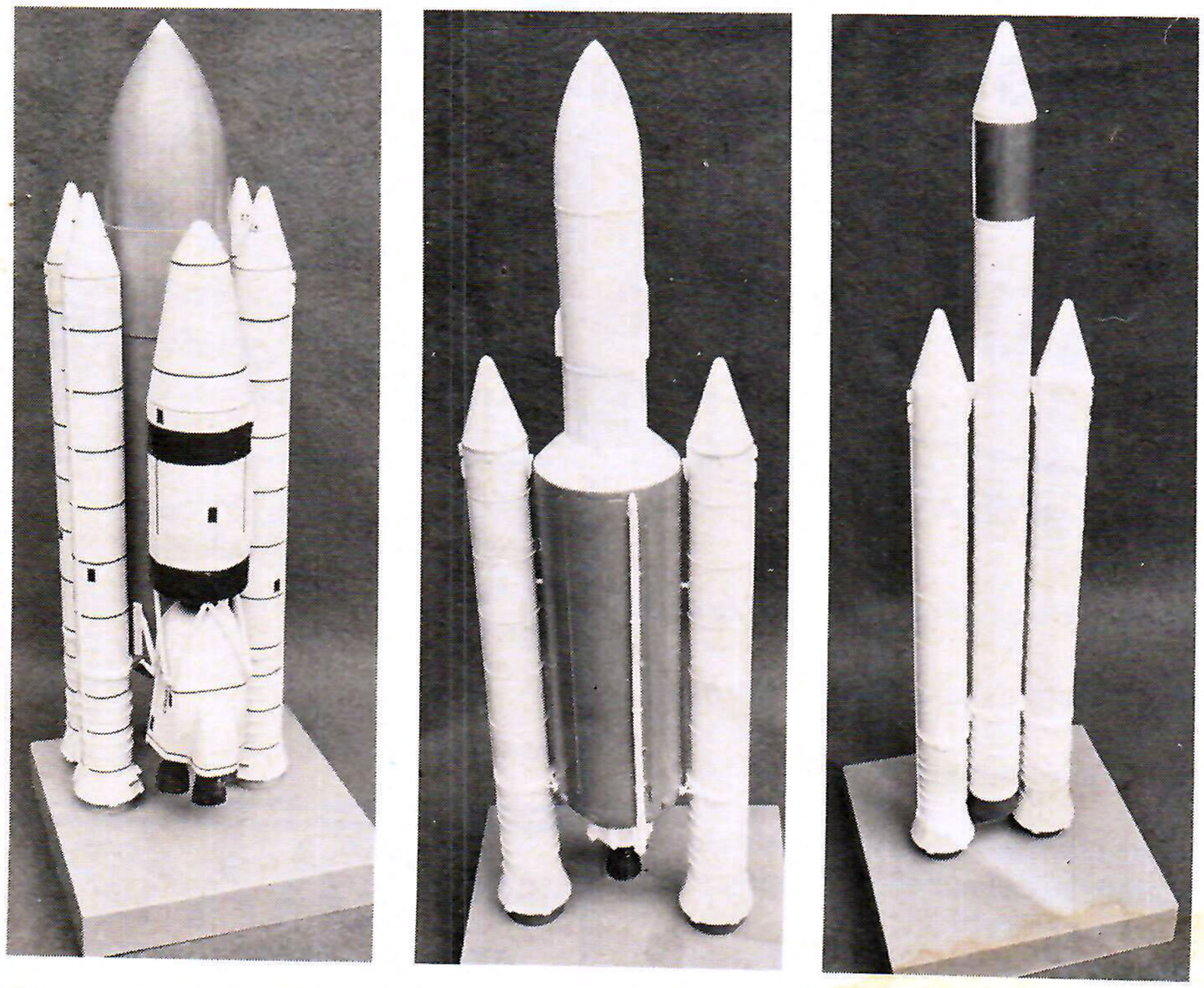
During the ALT (Approach and Landing Tests) in 1977, *Enterprise* and NASA 905 performed three taxiing tests; five Captive/ Inactive flights (without any crew aboard the Orbiter); three Captive/ Active flights and finally five ALTs proper, with the Orbiter separating from the Boeing and gliding back down to Earth. Then came the mating of the Orbiter with the SRBs and ET for the first time, the whole structure being positioned on the launch pad at Kennedy Space Center, and termed, in this configuration 'Pathfinder'. Later, in 1984, she will be used to check out the second Shuttle launch pad at Vandenberg Air Force Base.

Belated thanks to NASA for having the enterprise to tour the *Enterprise,* I hope they feel the effort was worth it. I think it was, particularly considering the response they had in the UK. I only wish we had an equivalent organisation in this country – a British Space Agency – to co-ordinate relevant activity, but that is a topic for another time . . .

STS-8 update

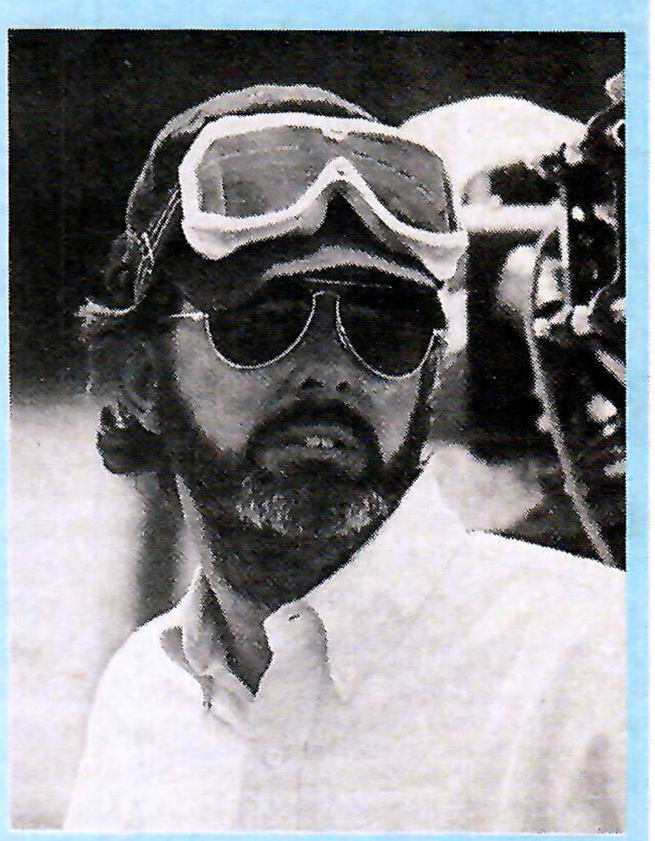
Because of the gap in the payload, caused by the deletion of the second TDRS, a quarter of a million special postal covers flew instead. It was a joint project by NASA and the US Postal Service, and featured the $9.35 stamp on a cover featuring the STS-8 logo on the front and NASA's 25th anniversary on the back.

The future of the Shuttle. Left, the HLLV Heavy Lift Launch Vehicle; centre, shortened ET with SSME below and, right, the SRB-X configuration. Models and photos: Mat Irvine



NEXT ISSUE

★ **FEATURING. . .**



George Lucas, creator of the 'Star Wars' saga has recently been the subject of a new biography, 'Skywalking', by Dale Pollock. In the next issue we interview the lucky author.

RETURN OF THE JEDI
– Concluding our exclusive look-behind-the-scenes feature.

WARGAMES – We interview director John Badham and scriptwriter Walter Parkes.

UFO
– Getting behind the great saucer mystery.

GOLDEN AGE OF SCIENCE FICTION
– Another nostalgic trip to the 1950s, looking at classic comics.

BUILDING LUNA
– How to model the ship from George Pal's 'Destination Moon'.

TWILIGHT ZONE
– Concluding our coverage of the new film.

REVIEW
– New models, toys, kits, products, videos, TV games and, of course, another great competition!

ISSUE No. 6

(DECEMBER/JANUARY)

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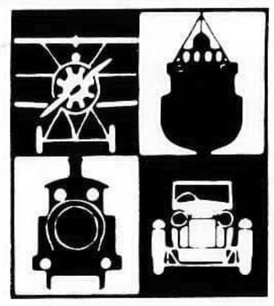

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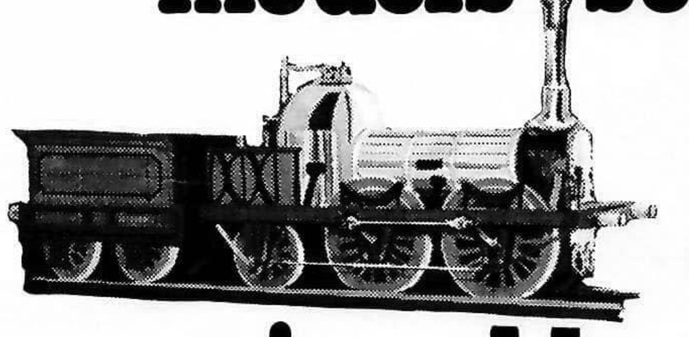

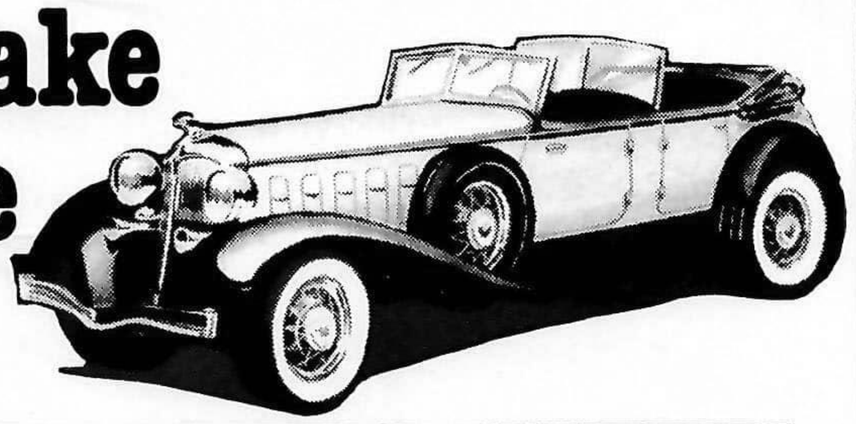

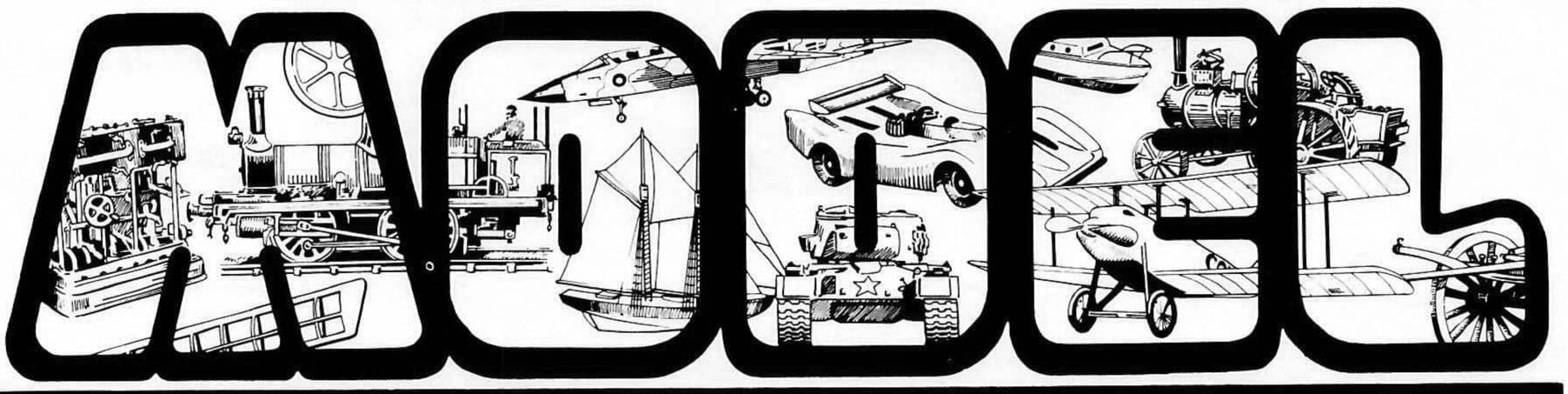

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